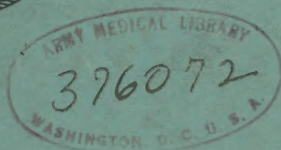


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STATE OF ILLINOIS
HENRY HORNER, Governor

EVALUATION OF THE
INDUSTRIAL HYGIENE PROBLEM
OF ILLINOIS



DEPARTMENT OF PUBLIC HEALTH

A. C. BAXTER, M. D., Director

Springfield, Illinois

1939

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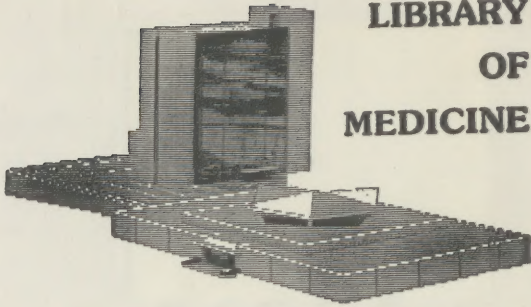
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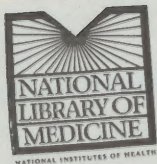


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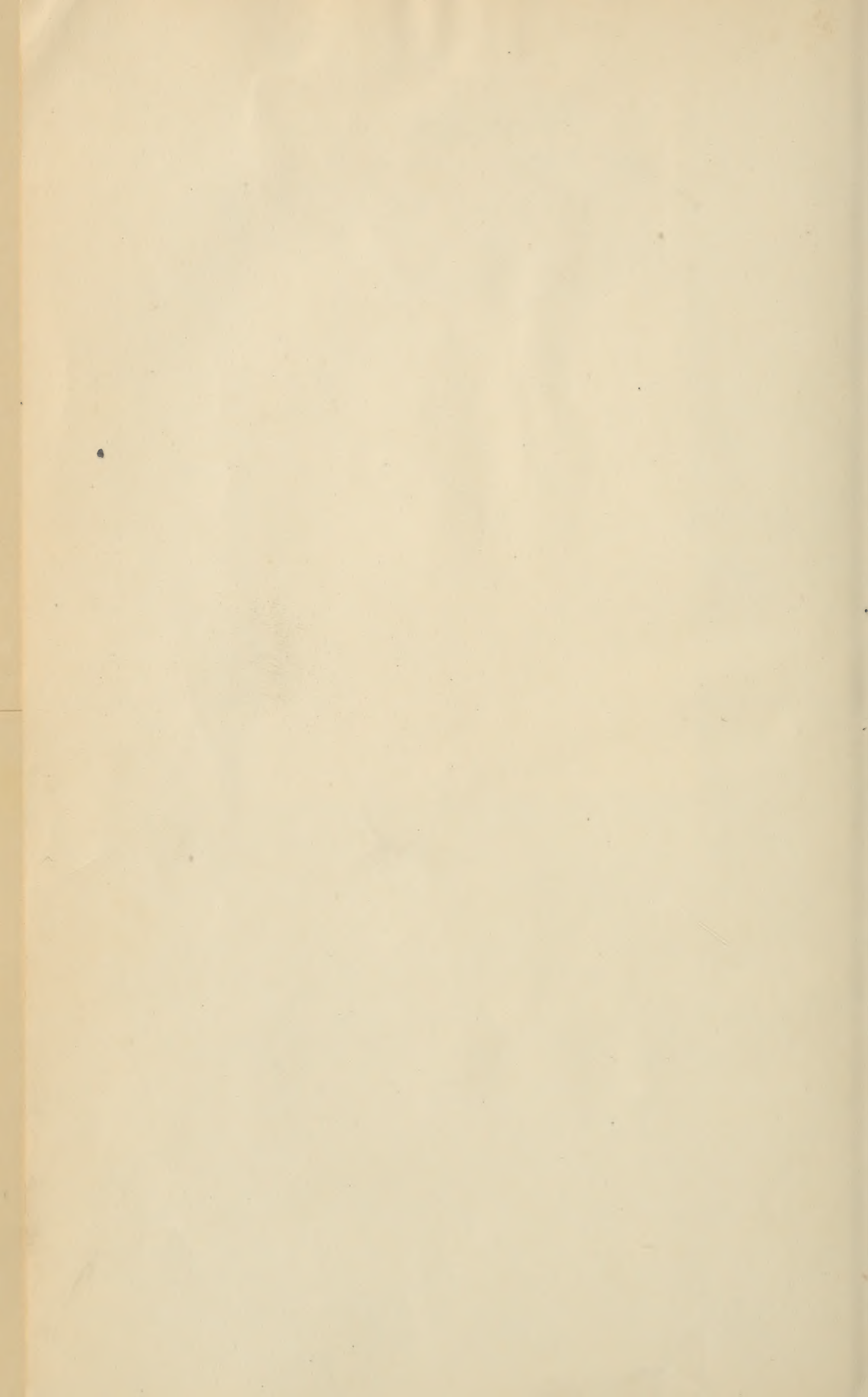


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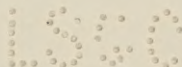
EVALUATION OF THE INDUSTRIAL HYGIENE PROBLEMS OF ILLINOIS

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1939



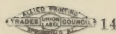
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EVALUATION OF THE

INDUSTRIAL HYGIENE PROBLEMS

OF ILLINOIS



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DIVISION OF INDUSTRIAL HYGIENE

REPORT OF THE DIVISION OF INDUSTRIAL HYGIENE
ON THE RESULTS OF THE INVESTIGATION OF THE
INDUSTRIAL HYGIENE PROBLEMS OF ILLINOIS
FOR THE YEAR 1939

1940

Chicago, Ill.

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FOREWORD

This study was conducted in order to familiarize the Division of Industrial Hygiene with the health problems to which employees in the industries of Illinois are exposed by reason of working environment, manufacturing methods and materials used; and for the further purpose of appraising the existing efforts at solving or avoiding these problems. Bringing together the data herewith presented was deemed necessary to the formation of public health program commensurate with the needs in the industrial field in Illinois.

The information gathered, secured by visual methods, concerns itself chiefly with the conditions of environment. No definite opinions, therefore, can be validly expressed on the basis of these data as to the extent or magnitude of conditions inimical to industrial hygiene.

This report should not be interpreted as necessarily indicating that the conditions now existing are unhealthful. This is only a statistical compilation of the findings of the survey. The data should prove a basis for promulgating a future permanent program in industrial hygiene in Illinois.

FUNCTIONS
OF THE
DIVISION OF INDUSTRIAL HYGIENE
ILLINOIS STATE DEPARTMENT OF PUBLIC HEALTH

The division was established in July, 1936. This was made possible through Social Security Funds allocated to the Illinois State Department of Public Health.

For the necessary and successful performance of its duties and functions, the personnel was selected according to the qualifications and standards formulated by the Conference of State and Provincial Health Authorities of North America.

In order to cope with the problems of environmental hygiene and sanitation in industry, and to be prepared to answer the call of those directly involved, the division offers the following services to employee, employer, medical and nursing profession, technical groups and other interested agencies.

1. *Medical*

- Evaluation of environmental exposures.
- Diagnostic aid to medical profession.
- Maintenance of an Occupational Disease Clinic for case study.

2. *Engineering*

- Plant surveys and studies of industrial processes and operations.
- Collection of industrial atmospheric contaminants.
- Recommendations for methods of control.

3. *Chemical*

- Complete laboratory facilities for analyses of materials and air samples.
- Research in methods of collection and determination of atmospheric contaminants.

4. *Educational*

- Lectures.
- Radio addresses.
- Exhibits.
- Pamphlets.
- Under-graduate training of medical students at the University of Illinois, College of Medicine.
- Instructions in laboratory technique to interested agencies.

5. *General*

- Integration of functions with existing public health activities.
- Industrial health service to city and county health agencies.
- Clearing house for industrial health information.
- Special studies as requested.

INTRODUCTION

1. Scope and plan of survey
 2. Size distribution of plants in survey
 3. Acknowledgments
-

INTRODUCTION

Illinois ranks as the third largest industrial State in the country, and the largest State in the mid-west area. The 1930 U. S. Census figures revealed that 3,184,684 persons were at that time gainfully employed of which 1,147,379 persons were in industries in which the environments presented the greater potential hazards to health. Therefore, with over one-third of the gainfully employed persons in industries known to present the greater potential hazards to health, it is immediately apparent that industrial hygiene integrated into a public health program becomes of paramount importance if the health of the people of Illinois is to be enhanced.

The integration of industrial hygiene, as a function of public health, is the most practical approach for the betterment of the health of our industrial population. As to what constitutes an occupational disease and diseases of non-occupational origin, as far as health is concerned, is of minor significance. As far as health authorities are concerned, any and all diseases, to which the industrial worker may fall a victim by reason of his employment, is a public health problem and one which must be controlled. It is known that certain industrial materials are toxic and can produce harmful effects. Moreover, the importance to conserve the health of workers is further made clear by the fact that tuberculosis, pneumonia and degenerative diseases are much more frequent among industrial workers than among the general population. Therefore, industrial hygiene must be viewed as a phase of public health. It is designed not only to prevent occupational diseases, but to deal with the general health of workers and includes such subjects as poisons, dusts, abnormal humidities and temperatures, illumination, ventilation, noise, fatigue, over-crowding, women in industry, medical and nursing services, communicable diseases in industry, and mental and personal hygiene.

A program in industrial hygiene must chiefly center itself about the smaller plants in an industrial State such as Illinois, since 91 per cent of the industrial plants in this State employ 100 workers or less, according to U. S. Census figures. From this, it is immediately apparent that the approach to the problem, in order to be effective, becomes the duty of the State Department of Public Health since these smaller plants are not equipped or able to offer services in preventive medicine, environmental hygiene and sanitation to their employees. The larger industries that maintain adequate medical services have already and can continue to make commendable advancements in the improvement of working environments for their employees.

This report presents information on industrial welfare facilities in the industries surveyed; reveals the number of persons potentially exposed to the various manufacturing materials classified by industry; shows exposures of manufacturing materials by occupation in each sub-classification; and further reveals the extent of the use of recognized control measures in the principal industries. The information on exposures discloses only the potentialities involved. The data on control measures merely indicates that these were available and does not infer that they were adequate or approved.

This report, for the first time in studies of this type, presents extensive material on exposures by occupation in the various industries. In order to present the data in as practicable a way as possible, only the major exposures and the chief occupations were listed. The major exposures were taken as

those to which the greatest number of workers were exposed, and the chief occupations were taken as those employing the greatest number of workers. Therefore, all exposures of the listed occupations are not shown.

Scope and Plan of the Survey

Since it would require too great an expenditure of effort and money to survey all the industries of Illinois, it was decided to obtain a representative sample of the important industrial groups. This procedure, which has been successful in other industrial surveys of this type, consists mainly in making up a list of all the industries, and from this list selecting a certain percentage of plants in such a manner that size of plants and type of manufacturing are given importance in proportion to the frequency with which they appear on the list. Consequently, the conclusions based upon the sample may be applied to the total group. The accuracy of the sampling of the present survey is represented by the close correlation of the curves in the two graphs (Figs. 1 and 2) showing the distribution of plants according to size and number of workers in comparison with the U. S. Census and the Illinois Census.

It was also deemed advisable to limit the survey to plant workers and exclude administrative, clerical and other office personnel. This resulted in the elimination of 51,398 administrative and office employees. It was felt that this procedure would represent a more exact picture of the extent of occupational exposures, since it is the production type of worker with which we are chiefly concerned. In total, 303,251 plant workers in 3,358 Illinois industrial establishments were included.

The number of plants surveyed in each industrial classification is represented in Table I. This table reveals that a 26.5 per cent sample of the industries in Illinois was obtained. This average included a 10.5 per cent sample of the mineral extraction industry; a 27.6 per cent sample of the manufacturing and mechanical industry; and a 19.9 per cent sample of the personal service industry represented by laundries and dry cleaning establishments.

TABLE I—NUMBER AND PER CENT OF WORKERS SURVEYED, BY INDUSTRY
(Compared with 1930 U. S. Census)

Industry	Census	Number surveyed	Percent sample
All industries surveyed.....	1,147,379	303,251	26.5
Extraction of minerals (1).....	64,310	6,777	10.5
Coal mines.....	59,639	5,885	9.7
Other mines and Quarries.....	4,671	892	19.1
Manufacturing and mechanical (2).....	1,048,352	289,573	27.6
Chemical and Allied.....	42,957	17,950	41.9
Cigars and tobacco.....	3,022	500	16.6
Clay, glass and stone.....	25,751	11,305	44.1
Clothing.....	61,395	13,244	21.6
Food.....	90,165	23,988	26.6
Iron and steel (3).....	447,855	97,879	21.8
Other metal manufacturing—not iron and steel.....	38,751	33,154	85.4
Leather.....	24,327	10,271	42.3
Lumber and furniture.....	42,312	15,254	36.2
Paper, printing, publishing.....	80,985	20,751	25.6
Textile.....	14,605	6,925	47.3
Miscellaneous manufacturing.....	175,227	38,352	21.9
Personal service (domestic)			
Laundries, dry cleaning.....	34,717	6,901	19.9

(1) The total employees in the Oil and Gas Well group was omitted in deriving the total of 64,310 as none of these groups were surveyed.

(2) This total was obtained by subtracting 24,223 employees of the independent hand trades and 193,893 employees of the building trades from the MANUFACTURING AND MECHANICAL group, as listed in the 1930 U. S. Census.

(3) This total was obtained by adding from the TRANSPORTATION group 168,399 employees which is the total for the steam and street railroad group, as listed in the 1930 U. S. Census.

TABLE 2—NUMBER OF PLANTS AND EMPLOYEES IN THE ILLINOIS INDUSTRIES SURVEYED

Industry or service group	Number of plants	Number of workers		
		Total	Male	Female
Extraction of minerals.....	42	6,777	6,777	0
Coal mines.....	24	5,885	5,885	0
Other mines.....	16	836	836	0
Quarries.....	2	56	56	0
Manufacturing and mechanical.....	3,192	289,573	229,430	60,143
Chemical and allied.....	289	17,950	14,577	3,373
Charcoal and coke.....	2	403	401	2
Explosives and fireworks.....	7	879	559	320
Fertilizer.....	5	250	250	0
Gas works.....	2	86	86	0
Paint and varnish.....	66	1,878	1,691	187
Petroleum refineries.....	6	1,391	1,388	3
Rayon and synthetic casings.....	2	680	423	257
Soap.....	14	895	730	165
Other chemicals.....	4	3,066	2,862	204
Blacking, stains, etc.....	5	50	27	23
Ink, carbon paper, etc.....	24	673	529	144
Chemicals, dyes, etc.....	24	2,758	2,652	106
Compressed gases.....	9	96	95	1
Cleaning and polishing solutions.....	14	337	179	158
Drugs, medicines.....	14	1,160	616	544
Glue, paste, etc.....	14	268	263	5
Greases, tallow, etc.....	9	257	248	9
Oils (not petroleum).....	10	286	285	1
Cosmetics, perfumes.....	23	966	348	618
Miscellaneous.....	27	1,571	925	646
Cigars and tobacco.....	5	500	319	181
Clay, glass and stone.....	155	11,305	10,119	1,186
Brick, tile, terra cotta.....	22	1,192	1,192	0
Glass.....	12	4,263	3,472	791
Lime, cement, artificial stone.....	11	510	508	2
Marble and stone yard.....	34	337	336	1
Pottery.....	16	714	570	144
Other.....	25	1,643	1,622	21
Asphalt and roofing materials.....	17	2,215	2,059	156
Asbestos products.....	9	292	242	50
Grinding wheels, sandpaper, etc.....	9			
Miscellaneous.....	103	13,244	2,998	10,246
Clothing.....	7	975	91	884
Corsets.....	8	1,723	405	1,318
Gloves and mittens.....	12	732	163	569
Hats.....	5	379	62	317
Shirts, collars, etc.....	23	1,660	1,660	2,634
Suits, coats, etc.....	39	4,890	516	4,374
Dresses, etc.....	9	251	101	150
Miscellaneous.....	276	23,988	15,560	8,428
Food and allied.....	65	6,057	4,307	1,750
Bakeries.....	38	1,036	1,025	111
Dairy products.....	27	5,006	1,838	3,168
Confectionery.....	5	54	34	20
Fish curing and packing.....	18	1,225	1,160	65
Flour and grain.....	8	436	1,160	276
Fruit and vegetable.....	38	3,873	3,873	1,027
Slaughter and packing.....	30	3,408	2,029	1,379
Liquor and beverages.....	47	1,866	1,234	632
Miscellaneous.....	759	97,879	93,644	4,235
Iron and steel.....	15	14,434	14,330	104
Agricultural implements.....	51	10,600	10,236	364
Auto and accessories.....	36	733	733	0
Auto repairs.....	8	8,385	8,351	34
Blast furnaces and steel.....	12	4,725	4,725	38
Car and railroad shops.....	4	79	79	0
Ship and boats.....	6	417	417	0
Carriages, wagons, trailers.....	65	10,321	10,227	94
Other.....	62	991	991	0
Foundries.....	247	19,508	16,994	2,514
Machine shops.....	176	20,470	20,129	341
Small machinery, hardware.....	77	6,978	6,432	546
Heavy machinery.....	411	33,154	27,491	5,663
Metal industries (not iron and steel).....	66	5,302	4,815	487
Brass and bronze.....	7	3,471	1,785	1,686
Clock and watch.....	6	607	531	76
Copper.....	4	50	44	6
Gold and silver.....	6	221	191	30
Jewelry.....	57	5,291	5,112	179
Lead and zinc.....	44	6,142	4,717	1,425
Tinware, enamelware, etc.....	16	666	654	12
Other.....	80	5,267	4,121	1,146
Aluminum.....	87	5,265	4,739	526
Metal specialties.....	38	5,872	4,782	1,090
Electroplating, metal finishing.....	73	10,271	6,312	3,959
Miscellaneous.....	411	33,154	27,491	5,663
Leather.....	66	5,302	4,815	487
Brass and bronze.....	7	3,471	1,785	1,686
Clock and watch.....	6	607	531	76
Copper.....	4	50	44	6
Gold and silver.....	6	221	191	30
Jewelry.....	57	5,291	5,112	179
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Other.....	80	5,267	4,121	1,146
Aluminum.....	87	5,265	4,739	526
Metal specialties.....	38	5,872	4,782	1,090
Electroplating, metal finishing.....	73	10,271	6,312	3,959
Miscellaneous.....	411	33,154	27,491	5,663
Textiles.....	74	6,925	2,716	4,209
Cotton goods.....	8	584	252	332
Knit goods.....	16	2,195	797	1,398
Silk.....	1	996	177	819
Dyeing, finishing, etc.....	3	45	40	5
Woolen and worsted.....	3	285	211	74
Carpet mills.....	3	559	351	208
Hemp, jute, linen.....	1	20	20	0
Lace, etc.....	9	709	165	544
Rope, cordage.....	1	107	74	33
Tenon, window shades, etc.....	9	394	231	163
Miscellaneous.....	20	1,031	398	633
Miscellaneous manufacturing.....	472	38,352	26,164	12,188
Brooms and brushes.....	21	697	531	166
Buttons.....	3	192	113	79
Electric light and power.....	1	28	28	0
Electrical equipment.....	117	16,985	11,895	5,090
Electrical machinery.....	14	400	400	0
Storage batteries.....	31	2,043	1,176	867
Lamps, etc.....	1	299	161	138
Dry cell batteries.....	27	3,646	2,238	1,388
Rubber.....	5	81	37	44
Other.....	25	1,502	1,005	497
Artificial flowers.....	25	808	741	67
Mattress and bedding.....	45	2,626	1,531	1,095
Signs.....	6	362	320	42
Toys, etc.....	19	493	402	91
Hairgoods.....	8	350	82	268
Mirrors, lenses.....	42	1,842	1,604	238
Lamp shades, etc.....	15	1,229	912	317
Scientific instruments.....	7	704	380	324
Plastics.....	52	3,614	2,137	1,477
Wax paper.....	124	6,901	2,593	4,308
Wood preserving.....	77	5,458	1,779	3,679
Miscellaneous.....	42	1,417	789	628
Personal service.....	5	26	25	1
Laundries.....	3,358	303,251	238,800	64,451
Cleaning, dyeing, etc.....				
Miscellaneous.....				
Grand total.....	3,358	303,251	238,800	64,451

The U. S. Census lists for Illinois 1,098,069 gainful workers in the manufacturing and mechanical group. The figure 1,048,352, which is shown, was obtained by subtracting 24,223 employees of the independent hand trades and 193,893 employees of the building trades from the census figures and adding 168,399 employees of the steam and railroad group belonging to the transportation and communication classification.

Table 2 reveals the number of plants surveyed in each industrial classification and sub-classification, together with the number of male and female workers in each group. Of the 3,358 industrial plants surveyed, 3,192 were in the manufacturing and mechanical industry; 42 in the extraction of minerals industry; and 77 in the personal service industry. Of the total 303,251 employees included in this survey, 289,573 workers were in the manufacturing and mechanical industry; 6,777 in the extraction of minerals industry; and 6,901 in the personal service industry.

Size Distribution of Plants

The distribution of workers according to size of plants and the distribution of plants according to the number of workers is shown in Tables 3 and 4 for the manufacturing industries. These tables reveal that in our study approximately 63 per cent of all workers are employed in plants of 500 or less workers, and that 97 per cent of all plants employ less than 500 workers. These facts are of special interest and importance in determining to what extent industry will be able to cope with its industrial health and welfare problems.

Figures 1 and 2 represent the size distribution data, graphically outlined. It also reveals that the sample of industrial plants obtained in our study was a representative sample of Illinois industries. In Figure 2, the variation in the curves for the survey and census distribution of plants is due to the fact that we had intended to omit plants of less than five workers. Near the termination of the survey, we included several of these small plants.

Acknowledgments

Approximately 5,000 establishments in Illinois were contacted in undertaking this survey. The industries in Illinois cooperated wholeheartedly as manifested by the many letters of testimony extending their fullest cooperation and assistance. For this attitude, they are all to be highly commended.

The Industrial Hygiene Division of the U. S. Public Health Service rendered valuable assistance throughout the course of this study and our thanks are extended to Sanitary Engineer J. J. Bloomfield, Junior Chemist Mary E. Peyton, and Associate Public Health Engineer Richard T. Page.

TABLE 3—PERCENTAGE DISTRIBUTION OF WORKERS ACCORDING TO SIZE OF PLANTS

Industry	Number of workers	Percentage of workers according to size of plants								
		Less than 5	5 to 20	21 to 50	51 to 100	101 to 250	251 to 500	501 to 1000	1001 to 2500	2501 or more
U. S. census (1).....	8,838,743	3.2	6.7	9.2	10.1	17.9	15.1	13.3	13.0	11.5
Illinois (census) (1).....	691,555	2.4	6.3	9.1	9.8	17.6	13.7	12.8	11.5	16.8
Illinois survey (2).....	289,573	0.4	4.3	7.6	12.0	21.3	17.3	16.1	16.0	5.0
Extraction of minerals.....	6,777	0.0	1.2	2.6	11.5	30.7	33.2	20.8	0	0
Coal mines.....	5,885	0	0	0	10.7	27.4	38.2	23.7	0	0
Other mines.....	892	0.3	9.0	20.0	18.5	52.2	0	0	0	0
Manufacturing and mechanical.....	289,573	0.4	4.4	7.6	12.0	21.3	17.2	16.1	16.0	5.0
Chemical and allied.....	17,950	1.2	6.9	8.5	14.3	9.8	14.4	24.5	20.4	0
Cigars and tobacco.....	500	0	7.2	9.6	0	0	83.2	0	0	0
Clay, glass and stone.....	11,305	0.9	6.0	6.3	15.1	15.6	15.7	0	40.4	0
Clothing.....	13,244	0.1	2.2	4.1	11.4	23.1	40.8	10.5	7.8	0
Food and allied.....	23,988	0.2	4.1	8.9	14.1	29.1	13.4	19.3	10.9	0
Iron and steel.....	97,879	0.2	3.0	5.3	8.4	15.2	16.2	14.2	25.8	11.7
Metal industries (except iron and steel).....	33,154	0.5	5.4	7.8	11.3	24.1	19.6	15.1	7.4	8.8
Leather.....	10,271	0.2	1.6	4.7	9.0	22.8	37.8	23.9	0	0
Lumber and furniture.....	15,254	0.4	5.9	12.1	18.8	33.1	4.8	24.9	0	0
Paper and printing.....	20,751	0.6	7.2	13.7	17.1	32.1	15.3	8.0	6.0	0
Textiles.....	6,925	0.5	3.1	9.2	11.3	31.1	14.4	30.4	0	0
Miscellaneous manufacturing industries.....	38,352	0.5	4.7	8.5	14.2	24.4	14.4	18.8	14.5	0
Personal service.....	6,901	0.3	4.1	21.4	29.4	39.7	5.1	0	0	0
Laundries.....	5,458	0	2.1	16.5	31.4	43.5	6.5	0	0	0
Cleaning, dyeing, etc.....	1,443	1.3	11.7	39.9	21.5	25.6	0	0	0	0
Total all workers.....	303,251	0.4	4.3	7.7	12.4	22.0	17.4	15.8	15.3	4.7

[1] U. S. Census of Manufacturers (1930).

[2] Including only the workers in the manufacturing and mechanical group.

TABLE 4—PERCENTAGE DISTRIBUTION OF PLANTS ACCORDING TO NUMBER OF WORKERS

Industry	Number of plants	Percentage of plants according to number of workers								
		Less than 5	5 to 20	21 to 50	51 to 100	101 to 250	251 to 500	501 to 1000	1001 to 2500	2501 or more
U. S. census (1).....	203,538	47.0	26.3	12.5	6.1	5.0	1.8	0.8	0.4	0.1
Illinois (census) (1).....	14,561	44.9	26.8	13.1	6.5	5.3	1.9	0.9	0.4	0.2
Illinois survey (2).....	3,192	9.4	34.0	20.9	15.3	12.5	4.5	2.3	1.0	0.1
Extraction of minerals.....	42	2.1	11.9	14.3	26.2	26.2	14.3	4.7	0	0
Coal mines.....	24	0	0	0	33.4	33.4	25.0	8.2	0	0
Other mines.....	18	5.5	27.7	33.4	16.7	16.7	0	0	0	0
Manufacturing and mechanical.....	3,192	9.4	34.0	20.9	15.3	12.5	4.5	2.3	1.0	0.1
Chemical and allied.....	289	20.4	40.0	16.9	12.4	4.2	2.4	2.4	1.2	0
Cigar and tobacco.....	5	0	60.0	20.0	0	0	20.0	0	0	0
Clay, glass and stone.....	155	18.0	40.5	14.2	14.8	7.4	3.2	0	1.9	0
Clothing.....	103	3.9	23.4	16.5	20.3	18.4	14.6	1.9	1.0	0
Food and allied.....	276	4.6	30.5	24.0	17.4	17.0	3.3	2.5	0.7	0
Iron and steel.....	759	6.7	32.8	21.0	15.2	12.5	6.2	3.0	2.3	0.3
Metal industries (except iron & steel).....	411	9.7	38.4	19.8	13.2	12.1	4.3	1.8	0.5	0.2
Leather.....	73	5.5	20.5	19.2	17.8	17.8	13.7	3.5	0	0
Lumber and furniture.....	234	6.8	32.8	24.0	17.6	15.8	0.8	2.2	0	0
Paper and printing.....	341	8.5	35.8	25.0	14.6	12.3	2.6	0.9	0.3	0
Textiles.....	74	9.3	25.5	24.3	16.1	16.1	4.4	4.4	0	0
Miscellaneous manufacturing industries.....	472	10.1	33.0	21.0	16.3	13.2	3.6	2.0	0.8	0
Personal service.....	124	4.1	21.2	34.9	23.5	16.3	0.0	0	0	0
Laundries.....	77	0	13.0	32.4	31.2	22.1	1.3	0	0	0
Cleaning and dyeing.....	47	10.6	34.0	38.4	10.6	6.4	0	0	0	0
Total of all plants.....	3,358	9.1	33.2	21.4	15.8	12.8	4.4	2.2	1.0	0.1

[1] U. S. Census of Manufacturers (1930) excluding the plants in the "No Wage-Earner" group.

[2] Including only those plants in the manufacturing and mechanical group.

PERCENT OF TOTAL WORKERS IN PLANTS SMALLER THAN THE
SPECIFIED SIZE

FIGURE 1
DISTRIBUTION OF WORKERS BY SIZE OF PLANT
(CUMULATIVE PERCENTAGE BASIS)

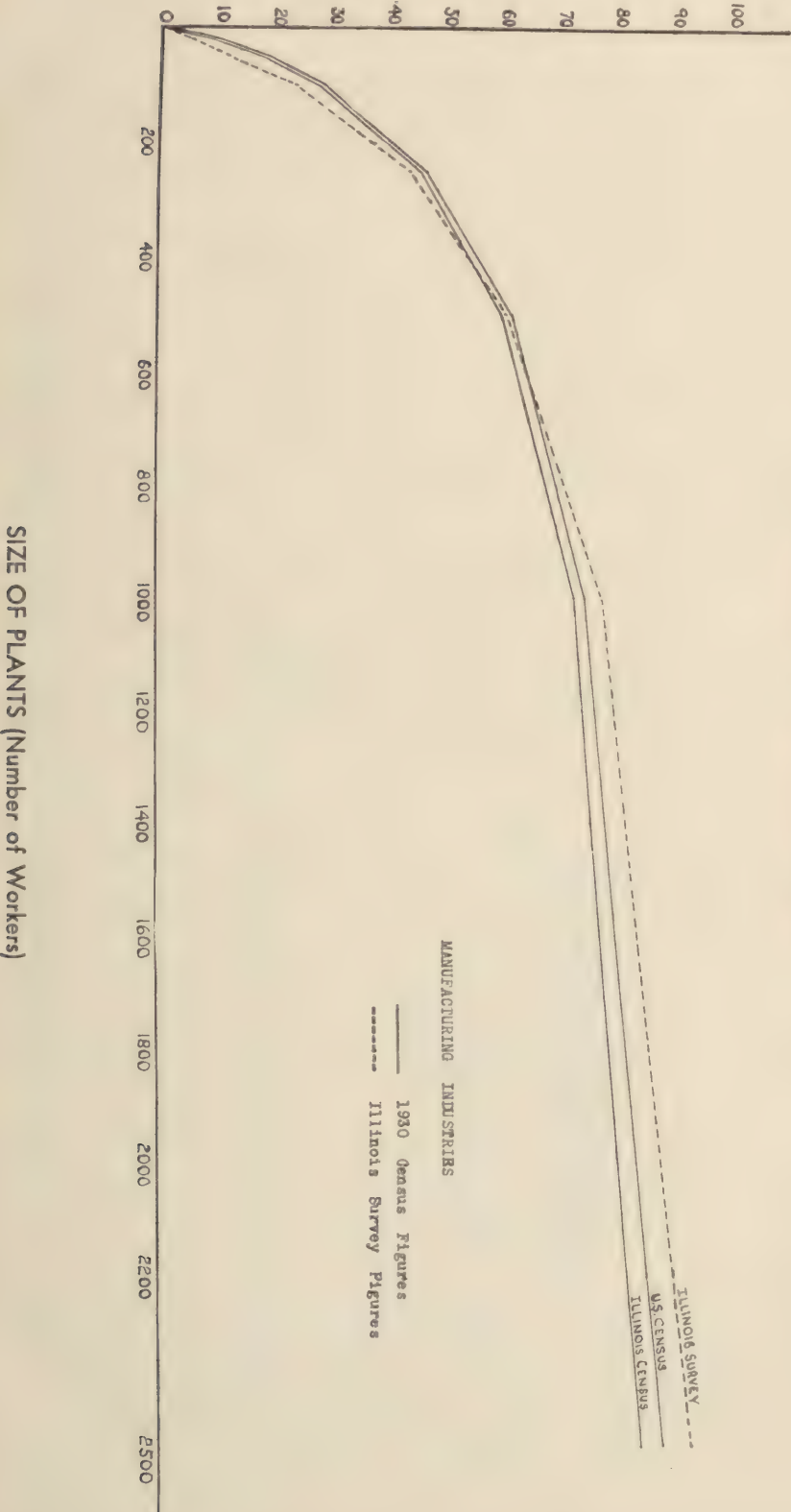
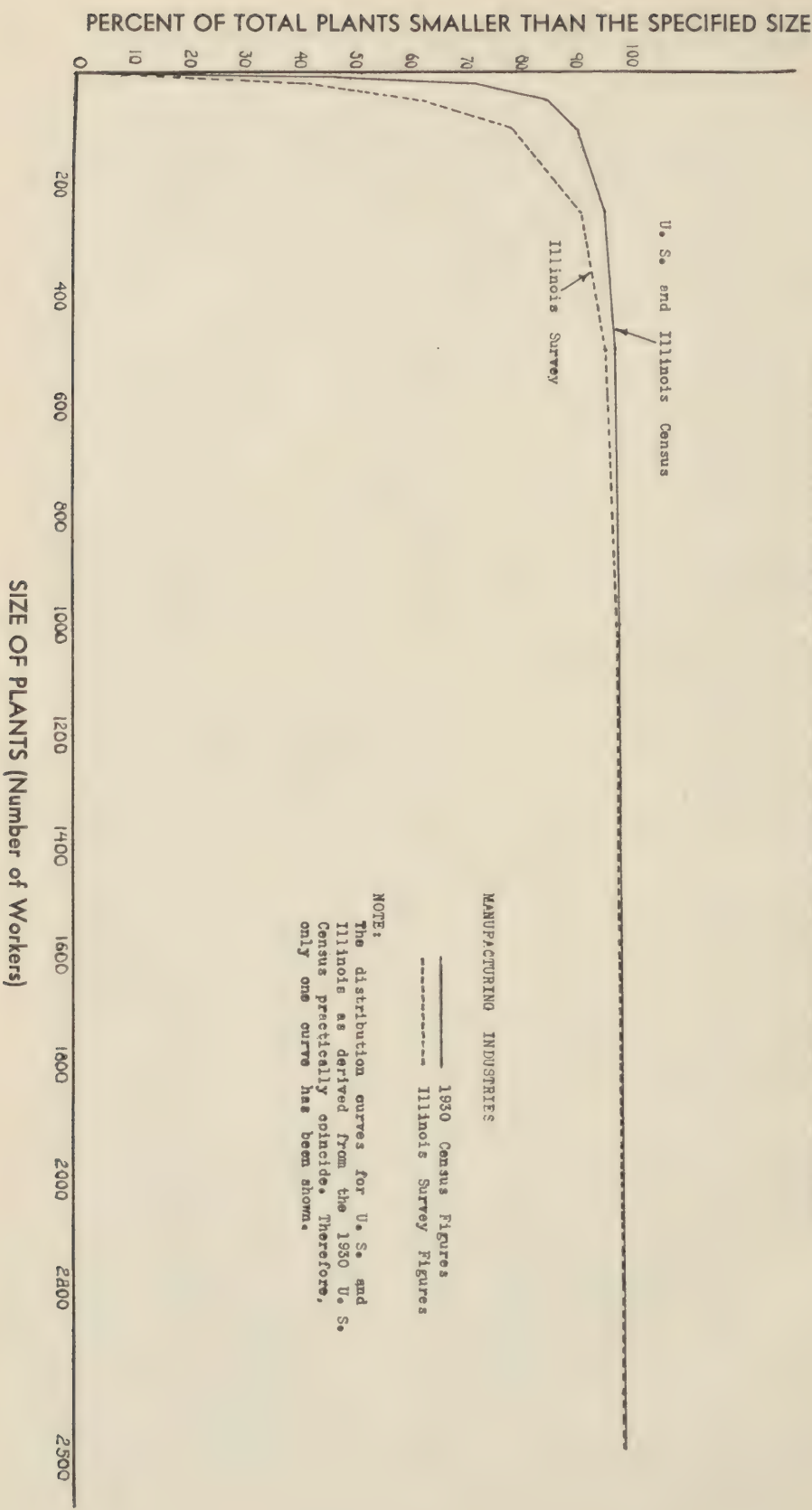


FIGURE 2
DISTRIBUTION OF PLANTS ACCORDING TO NUMBER OF WORKERS



SUMMARY

1. Industrial Welfare Provisions
 2. Exposed workers and exposures to specified materials
 3. Application of control measures
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Industrial Welfare Provisions

As industrial health and welfare programs are of far reaching significance in industrial relations, it was decided to obtain and enumerate health and welfare data in the plants covered in our survey. This data has been analyzed both for the entire group and for those plants of less than 100 and more than 100 workers.

Safety Provisions: Table 5 indicates the extent to which safety activities existed. For the entire group of plants, 21.7 per cent of the workers were served by full-time safety director, and 30.5 per cent by part-time safety director. Shop safety committees represented the services extended to 58.1 per cent of the workers. Insurance service, signifying safety services by an insurance carrier, was rendered in plants employing 90.5 per cent of the workers. Under "Other Safety Activities" is included membership in safety councils, displaying of health and safety posters, etc. These activities were found in plants employing 41.7 per cent of the workers.

The extraction of minerals industry have the greatest percentage of workers served by full-time safety directors (41.8 per cent). This is gratifying as it is considered a very hazardous industry, especially from the standpoint of accidents. Insurance coverage services are adequately represented in all classifications due to our present Workmen's Compensation laws. It should be noted that the industries of the personal service group (laundries and dry cleaning establishments) had comparatively little in the way of safety provisions for their employees. This was expected as laundries and dry cleaning plants are generally small and these industries are not considered as hazardous as are the extraction of minerals and manufacturing and mechanical groups.

In analyzing the safety data in relation to plants of 100 or more, and less than 100 workers, it was found that those plants with 100 workers or more were much more safety conscious than those with less than 100 workers, with but one exception, and that was the services rendered by insurance carriers. This exception, as previously mentioned, is mainly due to existing Workmen's Compensation laws. It is very interesting to note that the clay, glass and stone industry appears to be the one most safety conscious, while the iron and steel machinery and manufacturing industry is next in the recognition of the value of safety activities for their workers.

Medical Provisions: Table 6 represents the extent to which medical facilities were made available to employees. A company hospital was available only to 0.4 per cent of the workers. Hospital facilities, but on a contract basis, were available to 8.9 per cent of the workers. First-aid rooms in industrial establishments were available to 54.5 per cent of the workers, and trained first-aid workers were found in plants employing 33.7 per cent of the workers. The use of first-aid kits, as expected, was very common. It was also found that 9.8 per cent of the workers had the services of a full-time physician, and 20.2 per cent had the services of a part-time physician. A full-time nurse was found in plants employing 32.6 per cent of the workers, and 1.5 per cent of the workers had the services of a part-time nurse.

It is interesting to note that the manufacturing and mechanical industry is not surpassed by the extraction of minerals industry on medical provisions available, with the exception of trained first-aid workers. The exception is chiefly due to the fine educational programs in first-aid work carried on in the mining industry by governmental agencies. The mining; chemical and allied; clay, glass and stone; iron and steel; and non-ferrous metal industries appeared to offer medical facilities to the greatest number of its workers. The data

analyzed on plants of 100 or more workers and less than 100 workers shows that the former group is much more acquainted with the value and necessity of adequate medical facilities. This, of course, can be expected as the facilities of adequate medical services in the smaller plants apparently places a financial burden on them which often times they are unable to meet.

Benefits and Records: One of the most important phases of an industrial health program is the maintenance of adequate sickness and accident records and reports. Table 7 reveals the extent to which sick benefit associations and records are maintained. It was found that plants employing 42.2 per cent of the workers had sickness records, and plants employing 97.4 per cent of the workers had accident records available. Sick benefit organizations were found existing in plants employing 42.4 per cent of the workers. The enactment of a new all inclusive Occupational Disease law was apparently one of the chief factors in finding that 88.8 per cent of the workers were protected by Workmen's compensation benefits for occupational diseases. The greatest number of employees which had the services of sick benefit associations were found in the chemical and allied industries; iron and steel; non-ferrous metals; and leather industries.

Table 8 reveals the welfare provisions available, analyzed by plants of 100 or more and less than 100 workers, and is compared with the findings of similar studies in the Virginia and Maryland industries. Table 9 shows the welfare provisions available as obtained in our study and compared to those in other States where similar surveys were conducted. It is obvious that the situation in regard to welfare facilities in the industries of Illinois can be considerably improved.

TABLE 5—INDUSTRIAL WELFARE PROVISIONS—SAFETY PROVISIONS

ALL PLANTS							
Industry	Number of plants	Number of workers	Percent of workers to whom service is available				
			Safety director		Shop committees	Insurance service	Other safety activities
			Part time	Full time			
All industries.....	3,358	303,251	30.5	21.7	58.1	90.5	41.7
Extraction of minerals.....	42	6,777	20.2	41.8	51.6	69.2	38.8
Coal mines.....	24	5,885	19.6	48.0	58.2	73.5	37.1
Others.....	18	892	23.1	0	4.9	32.4	39.5
Manufacturing and mechanical.....	3,192	289,573	31.1	21.7	59.2	90.6	42.4
Chemical and allied.....	289	17,950	32.2	34.1	66.6	94.3	59.4
Cigar and tobacco.....	5	500	0	0	0	95.0	0
Clay, glass and stone.....	155	11,305	18.5	47.1	74.4	98.0	49.3
Clothing.....	103	13,244	10.3	0	16.8	92.8	12.9
Food and allied.....	276	23,988	32.2	14.8	58.0	97.0	35.4
Iron and steel.....	759	97,879	34.2	32.8	72.3	82.5	62.0
Metal industries—not iron and steel.....	411	33,154	35.4	14.7	65.0	88.3	41.0
Leather.....	73	10,271	26.7	20.5	50.2	99.0	38.2
Lumber and furniture.....	234	15,254	22.9	0	35.6	96.9	17.4
Paper and printing.....	341	20,751	29.1	9.0	36.5	98.4	33.6
Textiles.....	74	6,925	32.8	15.4	40.6	99.5	34.0
Miscellaneous manufacturing.....	472	38,352	35.0	12.8	56.5	94.2	41.6
Personal service.....	124	6,901	14.6	2.8	17.2	95.5	13.9
Laundries.....	77	5,458	13.2	3.5	19.7	95.5	14.3
Cleaning and dyeing.....	47	1,443	19.9	0	7.6	95.4	12.3
PLANTS EMPLOYING 100 OR MORE WORKERS							
All industries.....	691	228,114	37.0	27.5	71.3	89.0	51.5
Extraction of minerals.....	19	5,740	20.9	42.4	59.8	70.4	44.4
Coal mines.....	16	5,274	20.7	46.0	65.1	73.2	41.3
Others.....	3	466	22.7	0	0	36.1	77.3
Manufacturing and mechanical.....	651	219,281	37.6	27.4	71.9	88.2	51.8
Chemical and allied.....	28	12,381	39.8	47.1	87.5	96.4	77.1
Cigar and tobacco.....	1	416	0	0	0	100	0
Clay, glass and stone.....	19	8,110	17.1	61.5	93.3	100	62.7
Clothing.....	37	10,887	10.6	0	18.5	95.1	15.2
Food and allied.....	64	17,335	39.6	20.2	72.5	98.7	44.1
Iron and steel.....	186	81,451	38.5	38.9	82.0	79.6	59.6
Metal industries—not iron and steel.....	79	24,785	44.3	17.9	78.2	86.2	52.4
Leather.....	27	8,682	31.7	23.9	58.5	100	44.8
Lumber and furniture.....	44	9,574	33.4	6.3	49.4	97.4	23.1
Paper and printing.....	55	12,730	42.5	14.6	49.6	100	47.2
Textiles.....	18	5,271	42.3	18.5	51.3	100	42.4
Miscellaneous manufacturing.....	93	27,659	44.9	15.2	72.4	94.2	51.2
Personal service.....	21	3,093	18.1	4.5	27.3	95.5	26.7
Laundries.....	18	2,723	11.8	5.1	26.9	95.0	25.8
Cleaning and dyeing.....	3	370	63.5	0	28.7	100	33.8
PLANTS EMPLOYING LESS THAN 100 WORKERS							
All industries.....	2,667	75,137	10.8	4.2	18.3	94.0	12.0
Extraction of minerals.....	23	1,037	15.8	38.5	5.3	62.7	8.2
Coal mines.....	8	611	10.5	65.2	0	74.1	0
Others.....	15	426	23.5	0	12.9	46.1	19.5
Manufacturing and mechanical.....	2,541	70,292	10.7	3.9	19.0	94.2	12.6
Chemical and allied.....	261	5,569	15.8	4.2	17.7	89.4	20.1
Cigar and tobacco.....	4	84	0	0	0	70.4	0
Clay, glass and stone.....	136	3,195	22.2	10.1	26.6	92.2	15.1
Clothing.....	66	2,357	9.1	0	8.8	83.4	2.5
Food and allied.....	212	6,653	12.7	0.8	19.5	92.0	12.8
Iron and steel.....	573	16,428	12.7	3.1	24.7	97.0	14.2
Metal industries—not iron and steel.....	332	8,369	8.9	5.0	25.9	95.4	7.8
Leather.....	46	1,589	0	2.1	5.8	91.2	3.3
Lumber and furniture.....	190	5,680	5.4	6.5	12.4	96.1	7.9
Paper and printing.....	286	8,021	7.5	0	15.4	95.0	11.8
Textiles.....	56	1,654	2.1	5.7	6.2	97.5	8.2
Miscellaneous manufacturing.....	379	10,693	9.7	6.5	15.2	94.1	16.6
Personal service.....	103	3,808	11.8	1.4	9.1	95.3	3.5
Laundries.....	59	2,735	14.6	2.0	12.6	96.3	2.9
Cleaning and dyeing.....	44	1,073	4.9	0	0	93.0	4.9

TABLE 6—INDUSTRIAL WELFARE PROVISIONS—MEDICAL PROVISIONS
ALL PLANTS

Industry	Number plants	Number workers	Percent of workers to whom service is available									
			Hospital		First- aid room	First- aid kit	Trained first aid worker	Physician			Nurse	
			Com- pany	Con- tract				Part time	Full time	On call	Part time	Full time
All industries.....	3,358	303,251	0.4	8.9	54.5	97.7	33.7	20.2	9.8	85.5	1.5	32.6
Extraction of minerals.....	42	6,777	0	11.7	21.9	99.3	87.8	3.6	13.3	86.8	0	13.3
Coal mines.....	24	5,885	0	6.3	23.3	100	93.7	4.1	15.3	84.5	0	15.3
Others.....	18	892	0	47.7	12.2	91.5	47.5	0	0	100	0	0
Manufacturing and mechanical.....	3,192	289,573	0.4	8.9	56.3	97.5	33.0	21.0	9.9	85.3	1.6	33.7
Chemical and allied.....	289	17,950	1.6	5.4	66.1	93.2	34.2	40.8	13.8	79.4	4.9	41.8
Cigars and tobacco.....	5	500	0	0	83.3	100	83.3	0	0	97.1	0	0
Clay, glass and stone.....	155	11,305	0	2.2	62.5	99.2	36.8	24.3	13.7	64.3	3.7	48.8
Clothing.....	103	13,244	0	8.8	17.0	94.0	9.8	0	0	98.0	0	6.5
Food and allied.....	276	23,988	0	11.7	47.1	99.0	24.5	9.8	5.2	90.2	0	26.0
Iron and steel.....	759	97,879	0.2	6.8	69.5	99.5	41.0	27.5	22.8	78.0	1.2	42.8
Metal industries—not iron and steel.....	411	33,154	1.3	13.2	59.1	90.1	38.5	26.4	2.7	89.4	2.5	40.9
Leather.....	73	10,271	1.6	7.3	65.0	99.8	20.8	3.1	1.6	93.8	2.9	18.7
Lumber and furniture.....	234	15,254	0	9.4	33.3	99.7	13.7	10.5	0	99.6	0.4	8.2
Paper and printing.....	341	20,751	0	7.2	37.0	99.5	27.3	9.5	0	92.5	0	22.4
Textiles.....	74	6,925	0	7.1	42.1	89.2	14.0	19.6	0	96.2	0	28.1
Miscellaneous manufacturing.....	472	38,352	0	14.0	52.6	99.3	36.4	19.2	0.2	87.8	2.6	32.0
Personal service.....	124	6,901	0	5.5	12.4	97.5	7.9	2.8	0	92.7	0	5.2
Laundries.....	77	5,458	0	5.4	12.6	98.2	6.9	1.2	0	95.3	0	6.5
Cleaning and dyeing.....	47	1,443	0	5.9	11.3	95.5	11.8	8.7	0	83.2	0	0

PLANTS EMPLOYING 100 OR MORE WORKERS

All industries.....	691	228,114	0.5	9.8	70.0	98.5	39.6	25.4	12.8	82.0	1.8	43.1
Extraction of minerals.....	19	5,740	0	11.6	22.2	100	88.5	4.2	15.7	84.1	0	15.7
Coal mines.....	16	5,274	0	7.0	24.2	100	93.4	4.6	17.2	82.8	0	17.2
Others.....	3	466	0	63.9	0	100	41.2	0	0	100	0	0
Manufacturing and mechanical.....	651	219,281	0.5	9.9	72.0	97.4	39.1	26.3	13.0	81.8	1.9	44.4
Chemical and allied.....	28	12,381	2.4	4.6	86.8	91.0	38.2	52.8	19.5	74.1	6.6	59.7
Cigars and tobacco.....	1	416	0	0	100	100	100	0	0	100	0	0
Clay, glass and stone.....	19	8,110	0	0	81.8	100	43.3	29.3	19.2	54.5	4.1	68.1
Clothing.....	37	10,887	9.5	0	18.5	96.1	0.9	0	0	100	0	7.8
Food and allied.....	64	17,335	0	16.0	62.8	100	28.1	13.5	6.9	86.8	0	35.2
Iron and steel.....	186	81,451	0.2	7.2	82.1	99.3	45.8	32.6	27.2	74.0	2.4	51.4
Metal industries—not iron and steel.....	79	24,785	1.7	15.4	76.7	88.5	46.6	32.0	3.6	87.8	3.3	54.6
Leather.....	27	8,682	1.8	8.2	77.0	100	23.9	3.7	1.8	93.0	3.4	22.2
Lumber and furniture.....	44	9,574	0	10.7	50.7	100	17.4	16.8	0	100	0	13.1
Paper and printing.....	55	12,730	0	8.8	56.9	100	37.1	14.9	0	87.4	0	36.2
Textiles.....	18	5,271	0	3.5	54.7	85.0	14.8	26.5	0	96.1	0	36.9
Miscellaneous manufacturing.....	93	27,659	0	16.0	70.2	100	45.0	24.9	0	84.7	3.1	43.8
Personal service.....	21	3,093	0	4.2	24.2	100	12.7	4.0	0	90.9	0	11.5
Laundries.....	18	2,723	0	4.8	23.4	100	9.4	0	0	93.5	0	13.0
Cleaning and dyeing.....	3	370	0	0	29.7	100	36.4	33.8	0	66.2	0	0

PLANTS EMPLOYING LESS THAN 100 WORKERS

All industries.....	2,667	75,137	0.1	6.0	7.5	97.6	15.2	4.1	0.5	96.3	0.6	0.5
Extraction of Minerals.....	23	1,037	0	12.3	19.8	95.7	81.3	0	0	100	0	0
Coal mines.....	8	611	0	0	15.7	100	100	0	0	100	0	0
Others.....	15	426	0	29.9	25.6	89.5	54.2	0	0	100	0	0
Manufacturing and mechanical.....	2,541	70,292	0.1	5.9	7.6	98.0	14.9	4.3	0.6	96.3	0.6	0.6
Chemical and allied.....	261	5,569	0	7.3	20.1	97.7	25.4	14.2	1.0	91.2	1.3	2.4
Cigars and tobacco.....	4	84	0	0	0	100	0	0	0	82.2	0	0
Clay, glass and stone.....	136	3,195	0	4.7	14.0	96.8	20.6	11.6	0	88.6	2.8	0
Clothing.....	66	2,357	0	5.7	9.4	83.9	14.6	0	0	89.0	0	0
Food and allied.....	212	6,653	0	0.6	6.2	96.4	14.7	0.2	0.7	98.0	0	1.3
Iron and steel.....	573	16,428	0.4	4.6	6.4	99.1	16.4	2.4	0.6	98.1	0.3	0.4
Metal industries—not iron and steel.....	332	8,369	0	7.0	6.8	95.9	14.9	10.7	0	94.2	0.2	0.2
Leather.....	46	1,589	0	2.7	0	99.7	4.5	0	0	99.8	0.5	0
Lumber and furniture.....	190	5,680	0	7.3	4.2	98.7	7.5	0	0	97.5	1.1	0
Paper and printing.....	286	8,021	0	4.7	4.9	98.1	11.4	0.9	0	97.4	0	0.4
Textiles.....	56	1,654	0	18.3	1.5	98.0	11.4	0	0	96.4	0	0
Miscellaneous manufacturing.....	379	10,693	0	9.0	7.3	97.8	14.1	4.4	0.7	97.0	1.2	0.8
Personal service.....	103	3,808	0	6.5	2.8	95.5	4.0	1.7	0	93.4	0	0
Laundries.....	59	2,735	0	5.9	2.0	97.1	4.3	2.4	0	96.4	0	0
Cleaning and dyeing.....	44	1,073	0	7.9	4.9	93.5	3.3	0	0	88.8	0	0

TABLE 7—INDUSTRIAL WELFARE PROVISIONS—BENEFITS AND RECORDS
ALL PLANTS

Industry	Number of plants	Number of workers	Percent of workers to whom service is available			
			Sick benefit organization	Sickness records	Accident records	Occupational disease coverage
All industries.....	3,358	303,251	42.4	42.2	97.4	88.8
Extraction of minerals.....	42	6,777	20.5	33.6	100	66.9
Coal mines.....	24	5,885	20.4	38.3	100	63.5
Others.....	18	892	20.6	1.9	100	88.0
Manufacturing and mechanical...	3,192	289,573	43.8	43.1	97.6	89.7
Chemical and allied.....	289	17,950	58.3	59.4	96.5	94.6
Cigars and tobacco.....	5	500	0	0	85.5	95.0
Clay, glass and stone.....	155	11,305	27.2	61.6	97.0	77.5
Clothing.....	103	13,244	8.6	17.5	95.0	80.4
Food and allied.....	276	23,988	27.6	37.4	96.8	90.3
Iron and steel.....	759	97,879	57.0	50.0	99.3	87.3
Metal industries—not iron and steel.....	411	33,154	50.5	50.8	97.5	95.2
Leather.....	73	10,271	50.7	38.9	96.0	78.4
Lumber and furniture.....	234	15,254	17.8	30.6	97.8	91.5
Paper and printing.....	341	20,751	40.3	25.8	94.5	90.0
Textiles.....	74	6,925	24.6	36.4	95.7	84.2
Miscellaneous manufacturing.....	472	38,352	38.5	34.6	96.9	96.3
Personal service.....	124	6,901	9.1	18.5	90.0	86.0
Laundries.....	77	5,458	8.2	18.1	92.5	88.2
Cleaning and dyeing.....	47	1,443	12.2	20.0	82.0	78.3

PLANTS EMPLOYING 100 OR MORE WORKERS

All industries.....	691	228,114	51.7	51.5	99.2	90.0
Extraction of minerals.....	19	5,740	23.8	39.2	100	70.5
Coal mines.....	16	5,274	22.8	42.7	100	68.0
Others.....	3	466	36.1	0	100	100
Manufacturing and mechanical...	651	219,281	53.0	52.0	99.0	90.5
Chemical and allied.....	28	12,381	73.5	77.0	100	99.0
Cigars and tobacco.....	1	416	0	0	100	100
Clay, glass and stone.....	19	8,110	30.5	78.5	100	73.3
Clothing.....	37	10,887	8.3	18.1	98.0	83.5
Food and allied.....	64	17,335	34.7	47.2	98.6	93.4
Iron and steel.....	186	81,451	65.3	57.2	99.7	86.9
Metal industries—not iron and steel.....	79	24,785	62.4	61.5	99.4	96.2
Leather.....	27	8,682	57.5	43.8	95.6	76.1
Lumber and furniture.....	44	9,574	23.3	38.6	98.8	96.8
Paper and printing.....	55	12,730	56.0	35.7	96.0	88.5
Textiles.....	18	5,271	29.1	45.2	100	876.9
Miscellaneous manufacturing.....	93	27,659	47.3	42.4	99.6	100
Personal service.....	21	3,093	15.2	35.3	89.8	92.8
Laundries.....	18	2,723	12.7	31.4	88.2	91.6
Cleaning and dyeing.....	3	370	33.8	63.5	100	100

PLANTS EMPLOYING LESS THAN 100 WORKERS

All industries.....	2,667	75,137	14.1	14.2	92.2	85.7
Extraction of minerals.....	23	1,037	1.6	1.6	100	45.7
Coal mines.....	8	611	0	0	100	25.7
Others.....	15	426	4.0	4.0	100	74.5
Manufacturing and mechanical...	2,541	70,292	14.8	14.9	92.3	86.7
Chemical and allied.....	261	5,569	24.1	20.3	88.4	84.5
Cigars and tobacco.....	4	84	0	0	13.1	69.1
Clay, glass and stone.....	136	3,195	18.9	19.5	88.5	88.2
Clothing.....	66	2,357	10.1	15.0	80.0	64.3
Food and allied.....	212	6,653	8.7	11.7	91.5	81.5
Iron and steel.....	573	16,428	15.7	13.9	96.5	89.2
Metal industries—not iron and steel.....	332	8,369	15.2	19.2	91.7	92.0
Leather.....	46	1,589	13.7	12.6	98.4	91.9
Lumber and furniture.....	190	5,680	8.6	17.5	96.0	82.5
Paper and printing.....	286	8,021	15.4	10.1	92.3	90.9
Textiles.....	56	1,654	10.3	8.2	80.7	72.8
Miscellaneous manufacturing.....	379	10,693	15.5	14.5	91.3	87.0
Personal service.....	103	3,808	4.1	4.8	90.5	81.0
Laundries.....	59	2,735	3.7	4.8	96.2	85.0
Cleaning and dyeing.....	44	1,073	4.9	4.9	75.7	70.5

TABLE 8—INDUSTRIAL WELFARE PROVISIONS IN PLANTS WITH 100 OR MORE WORKERS AS COMPARED WITH PLANTS HAVING LESS THAN 100 WORKERS FROM ILLINOIS, VIRGINIA AND MARYLAND SURVEYS.

Kind of service	Percentage of workers with listed service					
	Plants with 100 or more workers			Plants with Less than 100 workers		
	Illinois	Virginia	Maryland	Illinois	Virginia	Maryland
Safety organization						
Safety director:						
Part time.....	37.0	31.6	25.0	10.8	10.6	4.0
Full time.....	27.5	21.8	46.2	4.2	0.6	2.9
Shop committees.....	71.3	72.7	72.1	18.3	13.2	7.4
Insurance.....	89.0	99.6	98.8	94.0	95.2	93.8
Other.....	51.5	86.0	65.9	12.0	57.8	18.3
Medical provisions						
Hospital.....	*0	*0	*0	*0	*0	*0
Company.....	0.9	21.0	32.1	0.1	0.8	0.2
Contract.....	9.4	*0	*0	6.0	*0	*0
First-aid room.....	70.0	60.2	67.0	7.5	5.9	10.5
First-aid kit.....	93.1	98.6	99.2	97.6	93.0	91.7
Trained first-aid worker.....	39.6	73.4	76.9	15.2	27.4	18.8
Plant physician:						
Part time.....	25.4	30.5	42.0	4.1	4.8	44.3
Full time.....	12.8	25.3	38.2	0.4	2.1	0.6
On call.....	82.0	*0	*0	96.3	*0	*0
Plant nurse:						
Part time.....	1.9	2.4	0	0.6	0	0.02
Full time.....	43.1	37.5	50.1	0.5	0.8	0.43
Public health.....	10.3	*0	*0	0.2	*0	*0
Registered.....	34.0	*0	*0	0.3	*0	*0
Other.....	11.5	*0	*0	0.2	*0	*0
Disability statistics						
Sick-benefit organization.....	51.7	39.8	57.6	14.1	14.9	8.1
Sickness records.....	51.5	40.1	65.4	14.2	8.5	10.1
Accident records.....	99.2	99.8	98.7	92.2	93.1	89.7
Occupational disease coverage.....	90.0	*0	*0	85.7	*0	*0

*Data not available.

TABLE 9—COMPARISON OF THE INDUSTRIAL WELFARE SERVICE PROVISIONS IN ILLINOIS INDUSTRIES WITH SIMILAR DATA FROM OTHER STATES

Kind of service	Percent of workers with listed facility									
	Illinois	New Hampshire	Maryland	Utah	Virginia	South Carolina	Maine	Arkansas	Idaho	Indiana
Safety organization:										
Safety director—										
Part time.....	30.5	14.0	20.8	17.4	27.6	4.1	41.4	30.1	35.5	22.3
Full time.....	21.7	12.3	37.6	38.8	17.8	0	12.7	12.4	6.3	24.9
Shop committees.....	88.1	33.2	59.3	46.3	61.5	55.7	59.2	30.8	24.7	46.7
Medical provisions:										
Hospital (Company).....	0.4	1.4	25.8	25.5	17.2	(a)	4.5	3.6	10.1	4.0
First-aid room.....	84.5	47.3	55.8	62.2	50.0	35.0	51.3	22.2	31.0	55.0
First-aid kit.....	97.7	98.2	97.7	90.6	97.5	67.3	76.9	81.2	96.8	87.9
Trained first-aid worker.....	33.7	39.2	65.4	72.6	64.7	(a)	45.2	40.2	58.3	45.9
Physician:										
Part time.....	20.2	4.3	42.4	19.0	25.6	24.2	26.8	2.1	17.7	17.7
Full time.....	9.8	4.5	30.7	30.5	21.0	0	0.5	10.1	10.0	10.1
Nurse:										
Part time.....	1.5	1.7	0	4.9	1.9	3.7	1.9	1.7	0.1	0.8
Full time.....	32.6	21.2	40.3	25.2	30.6	23.8	33.8	8.7	16.8	35.5
Disability statistics:										
Sick-benefit association.....	42.4	28.7	47.8	64.6	35.1	(a)	31.7	19.4	36.0	52.4
Sickness records.....	42.2	29.3	54.5	65.3	34.1	26.8	35.5	22.8	38.5	55.4
Accident records.....	97.4	99.1	96.9	98.9	98.5	98.2	97.7	61.8	99.3	98.3

(a) Data not available.

Exposed Workers and Exposures to Specified Materials

Modern industry with its many and varied materials, incidental to its processes, expose workers at times to conditions productive of occupational disease and general ill health. It is only through detailed medical, engineering and chemical studies of these working environments and its workers that such conditions can be deemed hazardous. Although the exposures in our study represent only potential hazards and are important only as potentialities, they do, however, point out dangerous spots which should allow for further study before actual ill health overtakes the worker. Therefore, one of the most important objectives of this survey was to record materials, by-products and processes in use in the plants studied, in order that the potentialities of ill health could be uncovered. For practical reasons, the many materials of importance, from a health viewpoint, were classified under 49 groups. For example, such materials as benzol and toluol were classed under "Coal Tar Products"; ethyl acetate and acetone were classed under "Alcohols, Esters and Ethers"; and carbon tetrachloride and trichlorethylene classed under "Halogenated Hydrocarbons."

Table 10 reveals the number and per cent of workers exposed to the specified materials in the industrial classifications surveyed. The table is arranged numerically in the order of specified materials to which the greatest number of workers are exposed. It reveals that the largest number of workers were exposed to organic dusts, with "other metals" next in importance. The greatest number of workers exposed to organic dusts was found in the iron and steel industry, but the greatest percentage of workers exposed to this material was found in the textile industry. The chief exposures in the various industrial classifications are bituminous coal dust and gases in the extraction of minerals industry; organic dust and organic solvents in the chemical and allied industry; organic dust and dermatitis producers in the cigar and tobacco industry; silicate and silica dusts in the clay, glass and stone industry; organic dust and infections in the clothing industry; dermatitis producers and organic dust in the food and allied industry; other metals, dermatitis producers, silicate and silica dusts in the iron and steel industry; other metals, dermatitis producers and lead in the metals (non-ferrous) industry; organic dusts, dyes, infections and chromium compounds in the leather industry; organic dust in the lumber industry; organic solvents, ink and lead in the paper, printing and allied industries; organic dusts and dyes in the textile industry; organic dusts and lead in the miscellaneous manufacturing industry; and infections, alkalies, organic solvents and chlorine in the personal service industry. Table 11 reveals the chief material exposures in each industrial classification.

Table 12 shows the number of exposures and per cent of total exposures to specified materials for all industries and each industrial classification surveyed. This table is important as it reveals the distribution of the exposure to a specified material. The iron and steel industry shows the greatest percentage of exposure to inorganic dusts. It is interesting to note that the iron and steel industry with its 35.6 per cent, and the non-ferrous metals industry with its 13.5 per cent, have approximately 50 per cent of all the exposures. However, it cannot be inferred from this data that ill health is more prevalent in these industries than in the others for no quantitative studies were made of these exposures. At best, it can only be said that potentialities are revealed and that the mere use of a material does not imply a hazard.

TABLE 10--NUMBER AND PER CENT OF WORKERS IN EACH INDUSTRY OR SERVICE GROUP EXPOSED TO SPECIFIED MATERIALS

Materials	Number and percent of workers exposed																							
	All surveyed industries	Extraction of minerals	Chemicals and allied industries	Cigars and tobacco	Clay, glass, and stone	Clothing manufacture	Food and allied industries	Iron and steel	Metals other than iron and steel	Leather	Lumber	Paper, printing and allied industries	Textile manufacturing	Miscellaneous manufacturing industries	Personal service									
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Number of workers in surveyed plants.....	303,251		6,777		17,950		500		11,305		13,244		23,988		97,879		33,154		10,271		15,254		20,751	
Number of plants.....	3,358		42		289		5		155		103		276		759		411		73		234		341	
Percent of total workers.....	100		2.2		5.9		0.2		3.7		4.4		7.9		32.2		11.0		3.4		5.0		6.8	
Organic dusts.....	40337	13.3	26	*	3363	18.7	197	39.4	826	7.3	3342	25.2	4538	18.9	7004	7.2	2602	7.9	1763	17.2	6759	44.3	1529	7.4
Other metals.....	36918	12.2	135	2.0	1797	10.0	3	0.6	603	5.3	5	*	162	0.7	21866	22.4	8107	24.4	87	0.9	414	2.7	882	4.3
Dermatitis.....	35957	11.9	16	*	1083	6.1	163	32.8	198	1.8	0	0	6602	27.6	18278	18.7	5432	16.4	160	1.6	293	1.9	119	0.6
Silicate dusts.....	28777	9.5	763	11.3	833	4.6	2	*	3785	33.5	63	0.5	347	1.5	15791	16.2	3183	9.6	155	1.5	429	2.8	339	1.6
Silica dusts.....	19725	6.5	291	4.3	555	3.1	0	0	2112	17.9	3	*	31	*	12957	13.3	2752	8.3	2	*	173	1.1	24	*
Other gases.....	19197	6.3	4401	65.1	1685	9.4	7	1.4	666	5.9	91	0.7	1327	5.5	6894	7.0	2343	7.1	194	1.9	115	0.8	527	2.5
Organic solvents.....	18250	6.0	6	*	2822	15.7	7	1.4	234	2.1	90	0.7	211	0.9	4839	4.9	1537	4.6	575	5.6	854	5.6	4536	21.9
Petroleum.....	18212	6.0	129	1.9	1861	10.4	11	2.2	992	8.8	87	0.7	563	2.3	7818	8.0	2161	6.5	233	2.3	544	3.6	558	2.7
Carbon Monoxide.....	17590	5.8	4380	64.7	470	2.6	1	*	613	5.4	47	*	907	3.8	8294	8.5	2011	6.1	2	*	42	*	317	1.5
Lead.....	17254	5.7	7	*	1330	7.4	3	0.6	334	3.0	5	*	137	0.6	3721	3.8	4624	14.0	50	*	281	1.8	2835	13.7
Non-siliceous dusts.....	15776	5.2	98	1.5	923	5.1	2	*	1571	13.9	39	0.3	41	*	7497	7.7	2753	8.3	25	*	212	1.4	135	0.7
Alkalies.....	11795	3.9	10	*	2412	13.4	1	*	1477	13.1	20	0.2	899	3.7	2639	2.7	1739	5.3	365	3.6	112	0.7	491	2.4
Alcohols, esters and ethers.....	9679	3.2	0	0	1214	6.8	0	0	105	0.9	11	*	2148	9.0	1318	1.4	634	1.9	267	2.6	1027	6.7	967	4.7
Coal dust, bituminous.....	8956	3.0	5571	82.3	602	3.4	1	*	203	1.8	40	*	845	1.4	917	0.9	654	2.0	66	0.6	127	0.8	110	0.5
Oil.....	8080	2.7	0	0	1388	7.7	5	1.0	108	1.0	19	*	537	2.2	3627	3.7	739	2.2	470	4.6	340	2.2	183	0.9
Acids, mineral.....	7968	2.6	10	*	1495	8.3	1	*	127	1.1	5	*	211	0.9	2143	2.2	2018	6.1	200	2.0	107	0.7	666	3.2
Infection.....	6772	2.2	82	1.2	221	1.2	0	0	164	1.5	213	1.6	3542	14.8	178	*	*	*	671	6.5	167	1.1	42	*
Ink.....	5749	1.9	0	0	379	2.1	5	1.0	23	*	17	*	138	*	138	*	243	0.7	71	0.7	52	*	4414	21.3
Lacquer.....	5253	1.7	7	*	758	4.2	0	0	53	*	9	*	47	*	964	1.0	535	1.6	226	2.2	940	6.2	233	1.1
Paint.....	4387	1.4	15	*	680	3.8	0	0	106	0.9	1	*	66	*	2061	2.2	341	1.0	23	*	252	1.7	262	1.3
Chromium.....	4310	1.4	3	*	499	2.8	0	0	128	1.1	0	0	4	*	588	0.6	1029	3.1	671	6.5	46	*	599	2.9
Coal Tar Products.....	3992	1.3	0	0	836	4.7	0	0	412	3.6	0	0	168	0.7	695	0.7	203	0.6	55	0.5	164	1.1	396	1.9
Antimony.....	3891	1.3	0	0	67	*	0	0	11	*	1	*	7	*	270	*	615	1.9	0	0	13	*	2689	13.0
Dyes.....	3706	1.2	0	0	570	3.2	1	*	14	*	13	*	112	*	45	*	17	*	756	7.4	441	2.9	525	2.5
Other salts.....	3385	1.1	46	0.7	818	4.6	0	0	102	0.9	2	*	940	3.9	233	*	250	0.8	281	2.7	6	*	496	2.4
Aldehydes.....	3077	1.0	0	0	267	1.4	0	0	4	*	1	*	609	2.5	1621	1.7	197	0.6	28	*	2	*	35	*
Cyanides.....	2370	0.8	2	*	24	*	0	0	2	*	3	*	6	*	807	0.8	1007	3.2	1	*	42	*	187	0.9
Acids, Organic.....	1859	0.6	0	0	296	1.7	0	0	56	0.5	5	*	290	1.2	62	*	172	0.5	258	2.5	5	*	463	2.2
Fluorides.....	1770	0.6	266	3.9	230	1.3	0	0	13	*	0	0	35	*	529	0.5	337	1.0	0	0	8	*	51	*
Sulphur Dioxide.....	1729	0.6	0	0	689	3.8	0	0	318	2.8	0	0	26	*	131	*	482	1.5	14	*	0	0	2	*
Cadmium.....	1523	0.5	0	0	114	0.6	0	0	38	*	0	0	0	0	191	*	1044	3.2	0	0	0	0	0	0
Halogenated hydrocarbons.....	1567	0.5	0	0	254	1.4	0	0	10	*	17	*	8	*	417	*	313	0.9	29	*	40	*	56	*
Sulphur.....	1556	0.5	0	0	631	3.5	0	0	18	*	0	0	4	*	125	*	201	0.5	101	1.0	14	*	123	0.6
Accelerators.....	214	*	0	0	0	0	0	0	2	*	0	0	0	0	15	*	2	*	0	0	0	0	0	0
Anilines.....	197	*	0	0	123	0.7	0	0	0	0	2	*	0	0	1	*	0	0	0	0	2	*	50	*
Amines.....	428	*	0	0	234	1.3	0	0	0	0	0	0	0	0	2	*	0	0	37	*	0	0	0	0
Chemicals.....	1121	*	10	*	519	2.9	0	0	60	0.5	0	0	106	0.4	190	*	137	*	5	*	0	0	13	*
Asbestos.....	1436	*	0	0	159	0.9	0	0	1149	10.2	0	0	0	0	59	*	43	*	0	0	2	*	0	0
Coal dust, anthracite.....	275	*	0	0	0	0	0	0	1	*	0	0	1	*	3	*	204	0.6	0	0	0	0	0	0
Hydrogen Sulphide.....	296	*	0	0	186	1.0	0	0	0	0	0	0	30	*	7	*	9	*	57	0.6	0	0	0	0
Chlorine.....	755	*	0	0	183	1.0	0	0	0	0	0	0	162	0.7	31	*	12	*	1	*	2	*	11	*
Arsenic.....	758	*	0	0	44	*	0	0	224	2.0	0	0	0	0	4	*	266	0.8	160	1.6	0	0	0	0
Mercury.....	293	*	0	0	67	0.4	0	0	1	*	0	0	3	*	0	0	11	*	0	0	0	0	89	*
Manganese.....	990	*	0	0	142	0.8	0	0	282	2.5	0	0	0	0	270	*	168	0.5	0	0	0	0	38	*
Radioactive material.....	93	*	0	0	90	0.5	0	0	3	*	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Selenium.....	325	*	0	0	0	0	0	0	189	1.7	0	0	0	0	0	0	135	*	0	0	0	0	0	0
Nitrogen Oxides.....	1463	*	685	10.1	41	*	0	0	7	*	1	*	0	0	98	*	333	1.0	0	0	22	*	112	0.5
Medicinals.....	816	*	0	0	804	4.5	0	0	0	0	0	0	12	*	0	0	0	0	0	0	0	0	0	0
Phosphorus.....	89	*	0	0	14	*	0	0	0	0	0	0	0	0	9	*	14	*	0	0	0	0	0	0

(*) Less than 1/2 of 1% (0.5)

Two of the most important tables of the entire survey are Tables 13 and 14. By analyzing its columns "Percent of Workers Exposed" and "Number of Exposures per Person Exposed," the best index of the most potentially hazardous industries can be obtained. Table 13 reveals that for all the industries surveyed, 60.7 per cent of the workers were exposed and it was found that each exposed worker averaged 2.1 exposures. The extraction of minerals industry with 95.7 per cent of the workers exposed and with 2.6 exposures per exposed worker, appeared to be the greatest potentially hazardous industry based on these indices alone. Next in importance was the manufacturing and mechanical industry with 60.9 per cent of the workers exposed and with 2.0 exposures per exposed worker. The personal service industry, although having only 20.6 per cent of the workers exposed, revealed 2.1 exposures per exposed worker. In the manufacturing and mechanical group, the chemical and allied, and the clay, glass and stone industries had the highest percentage of exposed workers and greatest number of exposures per exposed worker. Table 14 shows the same data as in Table 13, but analyzed for each industrial subdivision.

TABLE 11—MATERIALS IN EACH INDUSTRY OR SERVICE GROUP TO WHICH 10% OR MORE WORKERS ARE EXPOSED.

Industry or service group	Material	Exposed persons	
		Number	Percent
Extraction of minerals.....	Bituminous coal dust.....	5,571	82.3
	Other gases.....	4,401	65.1
	Carbon monoxide.....	4,380	64.7
	Silicates.....	763	11.3
	Nitrogen oxides.....	685	10.1
Chemical and allied industries.....	Organic dust.....	3,363	18.7
	Organic solvents.....	2,822	15.7
	Alkalies.....	2,412	13.4
	Petroleum products.....	1,861	10.4
	Other metals.....	1,797	10.0
Cigars and tobacco.....	Organic dust.....	197	39.4
	Dermatitis producers.....	164	32.8
Clay, glass and stone.....	Silicates.....	3,785	33.5
	Silica.....	2,112	17.9
	Non-siliceous dusts.....	1,571	13.9
	Alkalies.....	1,477	13.1
	Asbestos.....	1,149	10.2
Clothing.....	Organic dust.....	3,342	25.2
Food and allied industries.....	Dermatitis producers.....	6,602	27.6
	Organic dust.....	4,538	18.9
	Infection.....	3,542	14.8
Iron and Steel.....	Dermatitis producers.....	18,278	18.7
	Silicates.....	15,791	16.2
	Silica.....	12,957	13.3
Metal industries (except iron and steel).....	Other metals.....	8,107	24.4
	Dermatitis producers.....	5,432	16.4
	Lead.....	4,624	13.9
Leather.....	Organic dusts.....	1,763	17.2
Lumber and furniture.....	Organic dusts.....	6,759	44.3
Paper, printing and allied industries.....	Organic solvents.....	4,536	21.9
	Ink.....	4,414	21.3
	Lead.....	2,835	13.7
	Antimony.....	2,689	13.0
Textiles.....	Organic dusts.....	3,167	45.8
	Dye.....	860	12.4
Miscellaneous manufacturing industries.....	Organic dusts.....	5,077	13.2
	Lead.....	3,828	10.0
Personal service.....	Infection.....	799	11.6

TABLE 12—PERCENT OF TOTAL EXPOSURE TO SPECIFIED MATERIALS IN EACH INDUSTRY OF SERVICE GROUP

Materials	Number of exposures and percent of total exposures to specified materials																								
	All surveyed industries	Extraction of minerals	Chemicals and allied industries	Cigars and tobacco	Clay, glass, and stone	Clothing manufacture	Food and allied industries	Iron and steel	Metals other than iron and steel	Leather	Lumber	Paper, printing and allied industries	Textile manufacture	Miscellaneous manufacturing industries	Personal service										
Number of workers in surveyed plants.....	303,251	6,777	17,950	500	11,305	13,244	23,988	97,879	33,154	10,271	15,254	20,751	6,925	38,352	6,901										
Total number of exposures.....	380,906	16,959	33,762	410	17,344	4,152	25,211	135,347	51,610	8,059	14,049	25,112	5,704	40,154	3,033										
Percent of total exposures.....	100	4.5	8.8	0.1	4.6	1.1	6.6	35.6	13.5	2.1	3.7	6.6	1.5	10.5	0.8										
	Total No. of exposures	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Organic dusts.....	40,337	26	*	3363	8.3	197	0.5	826	2.1	3342	8.3	4538	11.2	7004	17.3	2602	6.4	1763	4.4	6759	16.7	1529	3.8	3167	7.9
Other metals.....	36,918	135	0.4	1797	4.9	3	*	6031	1.6	5	*	162	0.4	21866	59.3	8107	22.0	87	0.2	414	1.1	882	2.4	24	*
Dermatitis.....	35,958	16	*	1083	3.0	164	0.5	198	0.6	0	0	6602	18.4	18278	50.8	5432	15.1	160	0.4	293	0.8	119	0.3	53	0.1
Silicate dusts.....	28,777	763	2.7	833	2.9	2	*	3785	13.2	63	0.2	347	1.2	15791	54.8	3183	11.1	155	0.5	429	1.5	339	1.2	55	0.2
Silica dusts.....	19,725	291	1.5	555	2.8	0	0	2112	10.7	3	*	31	0.1	12957	65.6	2752	13.9	2	*	173	0.9	24	0.1	1	*
Other gases.....	19,197	4401	22.9	1685	8.8	7	*	666	3.5	91	0.5	1327	6.9	6894	35.9	2343	12.2	194	1.0	115	0.6	527	2.7	65	0.3
Organic solvents.....	18,250	6	*	2822	15.4	7	*	234	1.3	90	0.5	211	1.1	4839	26.5	1537	8.4	575	3.2	854	4.7	4536	24.9	134	0.7
Petroleum.....	18,212	129	0.7	1861	10.2	11	*	992	5.4	87	0.5	563	3.1	7818	42.8	2161	11.9	233	1.3	544	3.0	558	3.1	121	0.7
Carbon monoxide.....	17,590	4380	24.9	470	2.7	1	*	613	3.5	47	0.3	907	5.2	8294	47.2	2011	11.4	2	*	42	0.2	317	1.8	18	0.1
Lead.....	17,254	7	*	1330	7.7	3	*	334	1.9	5	*	137	0.8	3721	21.6	4624	26.8	50	0.3	281	1.6	2835	16.4	83	0.5
Non-siliceous dusts.....	15,776	98	0.6	923	5.8	2	*	1571	10.0	39	0.2	41	0.3	7497	47.5	2753	17.5	25	0.1	212	1.2	135	0.9	7	*
Alkalies.....	11,795	10	*	2412	20.4	1	*	1477	12.5	20	0.2	899	7.6	2639	22.4	1739	14.7	365	3.1	112	1.0	491	4.2	121	1.0
Alcohols, esters and ethers.....	9,679	0	0	1214	12.6	0	0	105	1.1	11	0.1	2148	22.2	1318	13.6	634	6.5	267	2.8	1027	10.6	967	10.0	29	0.3
Coal dust, bituminous.....	8,956	5531	62.2	602	6.7	1	*	203	2.3	40	0.4	345	3.9	917	10.3	654	7.3	66	0.7	127	1.4	110	1.2	38	0.4
Oil.....	8,080	0	0	1388	17.2	5	*	108	1.3	19	0.2	537	6.6	3627	45.0	739	9.2	470	5.8	340	4.2	183	2.2	40	0.5
Acids, Mineral.....	7,968	10	0.1	1495	18.8	1	*	127	1.6	5	*	211	2.6	2143	26.8	2018	25.2	200	2.5	107	1.3	666	8.7	79	1.0
Infection.....	6,772	82	1.2	221	3.3	0	0	164	2.4	213	3.1	3542	52.4	178	2.6	1	*	671	9.9	167	2.5	42	0.6	93	1.4
Ink.....	5,749	0	0	379	6.6	5	*	23	0.4	17	0.3	27	0.5	138	2.4	243	4.2	71	1.2	52	0.9	4414	76.8	28	0.6
Lacquer.....	5,253	7	0.1	758	14.4	0	0	53	1.0	9	0.2	47	0.9	964	18.4	535	10.2	226	4.3	940	17.9	233	4.4	0	0
Paint.....	4,387	15	0.3	680	15.5	0	0	106	2.4	1	*	66	1.5	2061	47.0	341	7.8	23	0.5	252	5.7	262	6.0	74	1.7
Chromium.....	4,310	3	*	499	11.6	0	0	128	3.0	0	0	4	0.1	588	13.7	1029	23.8	671	15.6	46	1.1	599	13.9	392	9.1
Coal tar products.....	3,992	0	0	836	20.9	0	0	412	10.3	0	0	168	4.2	695	17.4	203	5.1	55	1.4	164	4.1	396	9.9	0	0
Antimony.....	3,891	0	0	67	1.7	0	0	11	0.3	1	*	7	0.2	270	6.8	615	15.8	0	0	13	0.3	2689	69.2	2	*
Dyes.....	3,706	0	0	570	15.4	1	*	14	0.4	13	0.3	112	3.0	45	1.2	17	0.5	756	20.4	441	11.9	525	14.2	860	23.2
Other salts.....	3,385	46	1.4	818	24.2	0	0	102	3.0	2	*	940	27.7	233	6.9	250	7.4	281	8.3	6	0.2	496	14.6	47	1.4
Aldehydes.....	3,077	0	0	257	8.3	0	0	4	0.1	1	*	609	19.8	1621	52.7	197	6.4	28	0.9	2	*	35	1.1	36	1.2
Cyanides.....	2,370	2	*	24	1.0	0	0	2	*	3	0.1	6	0.3	807	34.1	1007	42.4	1	*	42	1.8	187	7.9	11	0.5
Acids, Organic.....	1,859	0	0	296	16.0	0	0	56	3.0	5	0.3	290	15.6	62	3.4	172	9.8	258	14.0	5	0.3	463	25.0	48	2.6
Fluorides.....	1,770	266	15.0	230	13.0	0	0	13	0.7	0	0	35	2.0	529	29.9	337	19.0	0	0	8	0.4	51	2.9	0	0
Sulphur Dioxide.....	1,729	0	0	689	39.9	0	0	318	18.4	0	0	26	1.5	131	7.5	482	27.8	14	0.8	0	0	2	0.1	1	*
Halogenated hydrocarbons.....	1,567	0	0	254	16.2	0	0	10	0.6	17	1.1	8	0.5	417	26.6	313	20.0	29	1.9	40	2.5	56	3.6	2	0.1
Sulphur.....	1,556	0	0	631	40.5	0	0	18	1.1	0	0	4	0.2	125	8.0	201	13.0	101	6.5	14	0.9	123	7.9	32	2.1
Cadmium.....	1,523	0	0	114	7.5	0	0	38	2.5	0	0	0	0	191	12.6	1044	68.5	0	0	0	0	8	0.5	0	0
Nitrogen Oxides.....	1,453	685	47.2	41	2.8	0	0	7	0.5	1	*	0	0	98	6.8	333	22.9	0	0	22	1.5	112	7.7	0	0
Asbestos.....	1,436	0	0	159	11.1	0	0	1149	79.9	0	0	0	0	59	4.1	43	3.1	0	0	2	*	0	0	0	0
Chemicals.....	1,121	10	0.9	519	46.3	0	0	60	5.4	0	0	106	9.5	190	17.0	137	12.2	5	0.4	0	0	13	1.1	1	*
Manganese.....	990	0	0	142	14.3	0	0	282	28.5	0	0	0	0	270	27.3	168	17.0	0	0	0	0	38	3.8	0	0
Medicinals.....	816	0	0	804	98.5	0	0	0	0	0	0	12	1.5	0	0	0	0	0	0	0	0	0	0	0	0
Arsenic.....	758	0	0	44	5.8	0	0	224	29.6	0	0	0	0	4	0.5	266	35.1	160	21.1	0	0	0	0	0	0
Chlorine.....	755	0	0	183	24.2	0	0	0	0	0	0	162	21.4	31	4.1	12	1.6	1	*	2	0.3	11	1.5	41	5.4
Amines.....	428	0	0	234	54.6	0	0	0	0	0	0	0	0	2	0.5	0	0	0	0	37	8.7	0	0	0	0
Coal dust, anthracite.....	275	0	0	0	0	0	0	1	0.4	0	0	1	0.4	3	1.1	204	74.1	0	0	0	0	0	0	1	0.4
Selenium.....	325	0	0	0	0	0	0	189	68.2	0	0	0	0	0	0	135	41.5	0	0	0	0	0	0	0	0
Hydrogen Sulphide.....	296	0	0	186	62.8	0	0	0	0	0	0	30	10.1	7	2.4	9	3.0	57	19.3	0	0	0	0	0	0
Mercury.....	293	0	0	67	22.9	0	0	1	0.3	0	0	3	1.0	0	0	11	3.8	0	0	0	0	89	30.4	0	0
Accelerators.....	214	0	0	0	0	0	0	2	0.9	0	0	0	0	15	7.0	2	0.9	0	0	0	0	0	0	0	0
Anilines.....	197	0	0	123	62.3	0	0	0	0	2	1.0	0	0	1	0.5	0	0	0	0	2	1.0	50	25.2	0	0
Radioactive material.....	93	0	0	90	96.8	0	0	3	3.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Phosphorus.....	89	0	0	14	15.8	0	0	0	0	0	0	0	0	9	10.1	14	15.8	0	0	0	0	0	0	0	0

* Denotes less than 0.05%.

TABLE 13—SUMMARY OF EXPOSED WORKERS AND NUMBER OF EXPOSURES CLASSIFIED
BY MAJOR INDUSTRIAL GROUPS

Industrial classification	Number of plants surveyed	Number of workers	Number of workers exposed	Percent of workers exposed	Total number of exposures	Number of exposures per exposed worker
All industries surveyed.....	3,358	303,251	184,181	60.7	380,906	2.1
Extraction of minerals.....	42	6,777	6,485	95.7	16,959	2.6
Coal mines.....	24	5,885	5,762	98.0	16,137	2.8
Other mines.....	18	892	723	81.1	822	1.1
Manufacturing and mechanical.....	3,192	289,573	176,273	60.9	360,914	2.0
Chemical and allied.....	289	17,950	13,230	73.7	33,762	2.5
Cigar and tobacco.....	5	500	293	58.6	410	1.4
Clay, glass and stone.....	155	11,305	7,934	70.2	17,344	2.2
Clothing.....	103	13,244	3,535	26.7	4,152	1.2
Food and allied.....	276	23,988	17,193	71.7	25,213	1.5
Iron and steel.....	759	97,879	64,596	66.1	135,347	2.1
Metal industries (except iron and steel)....	411	33,154	20,831	62.8	51,610	2.5
Leather.....	73	10,271	4,518	43.9	8,059	1.8
Lumber and furniture.....	234	15,254	8,780	57.6	14,049	1.6
Paper and printing.....	341	20,751	10,777	51.8	25,112	2.3
Textiles.....	74	6,925	3,642	52.7	5,704	1.6
Miscellaneous manufacturing.....	472	38,352	20,944	54.7	40,154	1.9
Personal service.....	124	6,901	1,423	20.6	3,033	2.1
Laundries.....	77	5,458	1,046	19.2	2,160	2.1
Cleaning and dyeing.....	47	1,443	377	26.1	873	2.3

TABLE 14—SUMMARY OF EXPOSED WORKERS AND NUMBER OF EXPOSURES CLASSIFIED
FOR EACH INDUSTRIAL SUB-CLASSIFICATION

Industry or service group	Number of workers	Number of workers exposed	Percent of workers exposed	Number of exposures per person exposed
Extraction of minerals	6,777	6,485	95.7	2.6
Coal mines	5,885	5,762	98.0	2.8
Other mines	896	723	80.6	1.1
Quarries	56	38	68.0	1.1
Manufacturing and mechanical	289,573	176,273	60.9	2.0
Chemical and allied	17,950	13,230	73.7	2.5
Charcoal and coke	403	332	83.0	3.3
Explosives and fireworks	879	588	66.9	1.5
Fertilizer	250	249	99.5	3.2
Gas works	86	68	79.0	2.0
Paint and varnish	1,423	1,423	75.9	4.2
Petroleum refineries	1,391	1,206	91.0	3.8
Rayon and synthetic casings	680	350	36.8	1.9
Soap	895	583	65.1	1.8
Other chemicals	3,066	2,571	84.0	1.6
Baking powder	50	32	64.0	4.3
Ink, carbon paper, etc.	673	528	78.5	3.4
Chemicals, dyes, etc.	2,758	2,100	76.3	2.3
Compressed gases	96	62	64.5	1.5
Cleaning and polishing solutions	335	201	59.7	4.2
Drugs, medicines	1,160	926	79.8	2.6
Glue, luster, etc.	257	181	67.6	1.9
Greases, tallow, etc.	268	221	86.0	1.9
Oils (not petroleum)	266	218	90.4	1.9
Cosmetics, perfumes	966	512	53.0	2.7
Miscellaneous	1,571	993	63.0	2.0
Cigars and tobacco	11,305	7,934	70.2	1.4
Clay, glass and stone	1,192	3,019	65.5	1.8
Brick, tile, terra cotta	4,263	2,443	57.4	2.4
Lime, cement and artificial stone	510	400	78.5	2.1
Marble and stone yard	357	284	80.0	2.0
Pottery	714	587	82.2	2.5
Other	1,643	1,221	74.5	2.2
Asphalt and roofing materials	2,215	1,603	72.5	2.0
Asbestos products	189	102	73.9	3.1
Grinding wheels, sandpaper, etc.	292	275	94.3	1.9
Miscellaneous	13,244	3,536	26.7	1.2
Clothing	1,975	67	6.9	1.3
Gloves and mittens	1,723	771	44.7	1.1
Hats	732	243	33.2	1.3
Shirts, collars, etc.	4,379	62	16.4	1.1
Suits, coats, etc.	4,234	1,657	38.6	1.2
Dresses, etc.	4,890	620	12.7	1.1
Miscellaneous	251	120	47.8	1.2
Food and allied	23,988	17,183	71.7	1.5
Bakeries	6,057	3,818	63.0	1.7
Dairy products	1,036	404	39.0	1.8
Confectionery	5,006	3,692	73.8	1.3
Fish curing and packing	54	46	85.2	3.3
Flour and grain	1,225	1,083	88.4	1.3
Fruit and vegetable	436	264	60.6	1.2
Slaughter and packing	4,900	4,033	82.4	1.3
Ice manufacturing	283	93	35.3	1.4
Coffee, spices, etc.	515	319	62.0	1.5
Liquor and beverages	3,408	2,600	76.0	1.4
Miscellaneous	1,088	831	75.5	1.9
Iron and steel	97,879	64,596	66.1	2.1
Agricultural implements	14,434	9,575	67.6	2.1
Auto and accessories	10,600	7,001	66.1	2.1
Auto repairs	733	650	88.8	2.4
Blast furnaces and steel	8,385	3,759	45.0	1.9
Car and railroad shops	4,763	2,677	56.2	1.9
Ship and boats	79	71	90.0	2.1
Carriages, wagons, trailers	417	226	54.2	1.7
Other	10,521	9,265	88.0	2.6
Foundries	901	863	87.0	1.9
Machine shops	19,508	12,358	63.3	1.7
Small machinery, hardware	20,470	13,786	67.3	2.1
Heavy machinery	6,978	4,365	62.6	2.7
Miscellaneous	33,154	20,831	62.8	2.5
Metal industries (not iron and steel)	5,302	3,543	66.7	2.4
Brass, screens and weatherstrips	3,471	1,132	32.7	1.8
Clock and watch	607	399	65.7	2.9
Copper	50	38	76.2	3.4
Gold and silver	221	93	42.1	2.9
Jewelry	5,291	4,130	78.0	2.9
Lead and zinc	6,142	3,607	58.8	2.7
Tinware, enamelware, etc.	10,521	9,265	88.0	2.6
Other	666	548	82.3	2.5
Aluminum	5,267	2,952	56.2	2.1
Metal specialties	5,872	688	75.9	3.8
Electroplating, metal finishing	5,265	3,701	70.3	2.6
Miscellaneous	10,271	4,518	43.9	1.8
Leather	221	111	50.3	1.6
Harness, etc.	416	133	32.0	1.4
Leather goods	6,516	2,149	33.0	1.4
Shoes	2,331	1,766	75.8	1.2
Tanneries	6,787	456	6.6	1.2
Trunks and suitcases	15,254	8,780	57.6	1.6
Lumber and furniture	9,008	6,206	69.0	1.4
Furniture	1,032	610	59.1	1.9
Caskets	1,733	844	48.6	1.4
Piano and organ	311	205	66.0	1.1
Planing and milling	3,140	2,013	64.0	1.5
Other woodworking	20,751	10,777	51.8	2.3
Paper and printing	1,204	358	29.7	2.1
Blank books, envelopes, tags	551	306	55.6	2.8
Wall paper	523	336	64.3	2.7
Paper and pulp	3,220	680	21.1	1.7
Paper box factories	669	497	74.4	2.1
Job printing	1,784	811	45.4	2.1
Book making and binding	2,012	1,338	66.7	2.6
Engraving	6,649	3,490	52.5	2.4
Lithographing	3,367	2,332	69.2	2.2
Newspapers	772	629	81.5	2.9
Stereotyping and electrotyping	6,925	3,642	52.5	1.6
Textiles	2,195	1,045	47.6	1.8
Cotton goods	996	84	8.4	1.1
Silk	45	21	46.7	2.3
Dyeing, finishing, etc.	285	126	44.3	1.7
Woolen and worsted	559	484	86.6	1.8
Carpet mills	20	20	100.0	1.2
Hemp, jute, linen	709	394	55.6	1.1
Lace, etc.	107	96	89.7	1.2
Rope, cordage	104	78	75.1	1.8
Tents and awnings	290	129	44.5	2.3
Window shades	1,031	690	66.8	1.6
Miscellaneous	38,352	20,944	54.7	1.9
Miscellaneous manufacturing	697	479	68.8	1.5
Brooms and brushes	192	61	31.8	1.2
Buttons	28	8	28.6	1.9
Electric light and power	16,985	8,787	51.7	1.8
Electrical equipment	400	368	92.0	2.4
Electrical machinery	2,043	959	47.0	2.1
Storage batteries	299	200	67.0	2.0
Lamps, etc.	3,646	2,323	63.5	2.8
Dry cell batteries	81	21	25.9	2.7
Rubber	1,502	727	48.4	1.3
Other	2,626	1,300	52.6	2.9
Artificial flowers	493	362	73.7	1.9
Mattress and bedding	1,842	299	60.7	2.0
Signs	350	50	14.3	2.0
Toys, etc.	1,229	968	52.4	1.7
Hairgoods	704	796	64.8	2.0
Mirrors, lenses	451	518	73.6	1.6
Lamp shades, etc.	3,614	207	45.9	1.5
Scientific instruments	6,901	2,109	58.5	1.8
Plastics	5,458	6,901	20.6	2.1
Wax paper	1,417	1,363	19.2	2.1
Wood preserving	26	14	25.6	2.2
Miscellaneous	303,251	184,181	60.7	2.1
Grand total	303,251	184,181	60.7	2.1

Application of Control Measures

In presenting data on the use of various control measures, no attempt has been made to determine whether or not such was adequate. The surveyor simply noted whether or not these measures were employed. Even the most efficient control measure can be incorrectly applied and before they can be evaluated, engineering and medical determinations must be made. Therefore, the data shown can only be considered as a recognition on the part of industry of the existence of potential hazards.

Table 15 reveals the total number of workers surveyed who were exposed to each specified material and the percentage of these workers having each of the indicated control measures afforded. More detailed control data is shown under each industry as analyzed in this report. Positive ventilation signifies mechanical general ventilation, whereas negative ventilation implies general exhaust ventilation. The classification of "Other" signifies gloves, goggles, aprons, etc., or any other control measure not indicated. It is interesting to find that local exhaust ventilation was the most prevalent type of control measure and that all types of mechanical ventilation were prevalent.

TABLE 15.—PERCENT OF WORKERS EXPOSED TO SPECIFIED MATERIALS HAVING INDICATED TYPE OF HAZARD CONTROL All Industries Surveyed

Materials	Total number of exposures	Percent of exposed workers having specified control								
		Positive ventilation	Negative ventilation	Local exhaust	Isolation	Wet method	Gas masks	Respirators	Pressure helmets	Other
All specified materials.....	380,906	6.3	11.5	19.3	1.7	2.4	0.1	3.7	0.3	4.4
Organic dust.....	40,337	6.1	7.5	29.6	0.6	1.0	0	2.8	0	0.3
Other metals.....	36,918	2.0	8.7	27.0	1.7	6.8	0	3.0	0.3	3.2
Dermatitis.....	35,957	3.4	8.2	7.4	0.1	0.1	0	0	0	8.3
Silicate dust.....	28,775	2.4	11.1	13.3	1.1	9.6	0	0.7	0.2	0.1
Silica dust.....	19,725	2.1	11.0	16.7	2.0	4.8	0	9.4	1.2	0.2
Other gases.....	19,197	19.7	12.6	32.4	3.7	0	0.9	2.6	0.5	0.4
Organic solvents.....	18,260	4.9	10.3	12.3	2.6	0	0.3	0.5	0.5	4.7
Petroleum.....	18,212	1.8	7.5	4.7	0.7	0	0	1.9	0.9	8.0
Carbon monoxide.....	17,590	21.4	12.7	36.8	0.5	0.6	0.3	6.1	0	0.2
Lead.....	17,294	3.6	11.2	21.7	0.5	0	0	6.1	0.3	5.7
Non-siliceous dust.....	15,796	2.6	7.1	36.0	0.2	9.7	0	9.0	0	0.9
Alkalies.....	11,795	2.5	11.3	12.4	7.7	1.7	0.4	4.3	0.4	13.4
Alcohols, esters and ether.....	9,679	3.3	12.0	22.4	2.4	0	1.1	2.0	1.4	4.9
Coal dust, bituminous.....	8,958	38.3	13.5	1.3	0.4	0.4	0	1.8	0	0
Oil.....	8,080	3.2	10.4	6.7	1.5	0	0	0.3	0	3.8
Acids, mineral.....	7,968	4.2	11.6	23.2	5.6	0.1	0.8	0.7	1.6	17.9
Infection.....	6,772	2.5	9.1	0	0	0.3	0	0.1	0	5.9
Ink.....	5,749	15.2	24.4	1.4	0.4	0	0	0.1	0	1.4
Lacquer.....	5,253	6.7	14.5	33.8	1.6	0.1	0	8.2	0.1	4.4
Paint.....	4,387	2.9	6.8	21.6	0.7	0.1	0	10.0	0.6	13.0
Chromium.....	4,310	4.1	13.0	34.4	1.7	0.8	0	5.0	0	20.1
Coal tar products.....	3,992	4.6	9.6	28.0	2.9	0.2	0.1	6.2	0	14.5
Antimony.....	3,891	12.3	18.8	21.9	0.7	0.2	0	4.8	0	3.0
Dye.....	3,706	4.3	12.7	9.8	1.9	0.7	0	3.6	0	7.1
Other salts.....	3,385	2.2	8.3	4.8	2.4	0.4	0	3.2	0	9.1
Aldehydes.....	3,077	2.8	13.1	39.9	1.7	0.1	0	1.4	0.1	4.6
Cyanide.....	2,370	4.0	10.1	25.6	1.6	0.5	0	0.5	0.2	22.8
Acids, organic.....	1,859	7.6	17.2	9.5	2.5	0	0	1.8	0	6.7
Fluorides.....	1,770	8.4	7.0	24.7	8.8	21.5	0	3.5	0	5.3
Sulphur dioxide.....	1,729	4.2	30.8	34.7	9.5	0	1.2	2.5	2.3	3.0
Halogenated hydrocarbons.....	1,567	2.8	14.7	21.1	5.1	0.4	0	0.6	0.2	12.7
Sulphur.....	1,556	1.7	11.4	14.8	2.0	2.2	0	5.1	0	16.4
Cadmium.....	1,523	1.8	8.5	22.9	2.8	0	0.7	0.9	0	1.4
Nitrogen oxides.....	1,453	34.5	10.8	25.3	0.6	0	0	25.2	0	1.7
Asbestos.....	1,436	0.1	4.5	23.6	0.6	4.2	0	1.0	0	0.9
Chemicals.....	1,121	5.6	12.3	4.4	0	0	0	0	0	3.3
Manganese.....	990	6.6	21.4	18.5	4.2	3.1	0	23.6	0	0
Medicinals.....	816	0.9	2.7	7.2	1.0	0	0	1.5	0	0
Arsenic.....	768	0	23.0	11.0	1.0	1.7	1.1	32.0	0	4.4
Chlorine.....	755	8.4	35.0	12.1	12.6	0	1.9	2.9	0	2.3
Amines.....	428	1.2	22.2	25.9	0.7	0	0	7.5	0	9.1
Selenium.....	325	0	43.1	6.8	0	0	0	51.4	0	0
Hydrogen sulphide.....	296	16.5	21.6	25.6	5.1	2.4	0	1.0	1.4	24.9
Mercury.....	283	5.1	13.0	4.8	9.1	0	0	3.8	0	0
Coal dust, anthracite.....	275	0	38.6	38.6	9.1	1.1	0	2.2	0	1.4
Accelerators.....	214	0.5	4.7	54.3	0	0	0	6.1	0	6.6
Anilines.....	197	5.1	12.2	15.7	5.6	0	0	7.1	0	2.2
Radioactive material.....	93	0	0	5.4	0	0	0	0	0	0
Phosphorus.....	89	0	0	60.8	7.9	2.2	0	4.5	0	6.7

CONCLUSIONS

CONCLUSIONS

The findings of this survey reveal that of the 303,251 plant workers covered in our study, 184,181 or 60.7 per cent were exposed to specified industrial materials and by-products, and that each exposed worker had an average of 2.1 exposures.

On the basis of the number of exposed workers in the study and the number of exposures found, the estimated number of exposed workers and the estimated total number of exposures for all the industries can also be obtained. This has been done and the data is revealed in Tables 16 and 17.

It is interesting to observe that the total number of exposed workers in the entire industries from which a representative sample was taken, was estimated to be 697,310. This indicates the necessity for the field of industrial hygiene activities in Illinois.

Addition interesting data is revealed in Table 17 on the estimated number of workers exposed to specified materials. Attention may be called to the number of workers exposed to industrial dusts which are as follows:

Organic Dust	117,591
Silicate Dust.....	112,107
Silica Dust	75,674
Non-siliceous Dust.....	56,844
Asbestos Dust.....	3,425

These figures can not be added or totaled as they are obtained from data in which a single worker may have been exposed to several of these dusts. They are only representative of the estimated number of workers exposed to each dust, and, therefore, cannot be treated collectively.

Attention is also called to the estimated number of workers exposed to some of the toxic elements and their compounds which are as follows:

Lead	56,645
Chromium	11,894
Cadmium	3,064
Arsenic	1,605
Mercury	1,090
Selenium	591
Phosphorus	328
Radioactive materials.....	222

The widespread use of solvents in industry is reflected by the large estimated number of workers so exposed. The following table shows the distribution of the various solvent groups tabulated:

Other Organic Solvents.....	65,333
Alcohols, Esters and Ethers.....	32,718
Coal Tar Products.....	13,949
Halogenated Hydrocarbons.....	5,392

The inroads of organic solvents into industry has made industrial health authorities concentrate a good deal of attention on them because of their many toxic episodes. New ones are entering industry so rapidly that it is almost im-

possible to keep abreast as to the knowledge of their ill effects. While the harmfulness of some specific solvents are known, the ill-effects of solvents when occurring in mixtures with others, may present different characteristics.

No definite conclusions can be drawn as to the extent of the actual hazard because detailed medical, engineering and chemical determinations are required to evaluate the various conditions which constitute the hazards to health. However, this data does definitely point out which industrial groups should be further studied, in order to benefit the greatest number of exposed workers. It does further present factual information upon which to base a permanent industrial hygiene program in Illinois. Therefore, if the health of the worker is to be enhanced, it must be through health activities based on an industrial hygiene program with public health methods, and in order to be effective can best be achieved by using industrial groups as the portal of entry.

The data at hand indicates that the potentialities of industrial diseases and ill health resulting from industrial environments are of such a magnitude that it requires intelligent means of study, control, and integrated activities. Since we have a need for it, it is the duty of the State to undertake such public health activities and by an understandable approach with intelligent plans and cooperative groups, eliminate those environments which are conducive to premature bodily decay. Although there is available today some tools for the success of an industrial hygiene program, we must continue to improve our tools, make new ones, and intelligently apply those at our command.

TABLE 16—ESTIMATED NUMBER OF EXPOSED WORKERS IN ALL ILLINOIS INDUSTRIES

Industry	Total number of workers (U. S. census)	Total number of workers surveyed	Exposed workers in survey group		Estimated number of exposed workers in entire industry
			No.	%	
All industries.....	1, 147, 379	303, 251	184, 181	60. 7	697, 310
Extraction of minerals.....	64, 310	6, 777	6, 485	95. 7	61, 790
Coal mines.....	59, 639	5, 885	5, 762	98. 0	58, 000
Other mines and Quarries.....	4, 671	892	723	81. 1	3, 790
Manufacturing and mechanical.....	1, 048, 352	289, 573	176, 273	60. 9	628, 370
Chemical and allied.....	42, 957	17, 950	13, 230	73. 7	31, 600
Cigar and tobacco.....	3, 622	500	293	58. 6	1, 760
Clay, glass and stone.....	25, 751	11, 305	7, 934	70. 2	18, 000
Clothing.....	61, 395	13, 244	3, 535	26. 7	16, 800
Food and allied.....	90, 165	23, 988	17, 193	71. 7	64, 500
Iron and steel.....	447, 855	97, 879	64, 596	66. 1	296, 000
Metal industries (not iron and steel).....	38, 751	33, 154	20, 851	62. 8	24, 300
Leather.....	24, 327	10, 271	4, 518	22. 7	5, 520
Lumber and furniture.....	42, 312	15, 254	8, 780	57. 6	24, 400
Paper and printing.....	80, 985	20, 751	10, 777	51. 8	41, 900
Textiles.....	14, 605	6, 925	3, 642	52. 7	7, 690
Miscellaneous.....	175, 227	38, 352	20, 944	54. 7	95, 900
Personal service.....	34, 717	6, 901	1, 423	20. 6	7, 150
Laundries, cleaners, etc.....	34, 717	6, 901	1, 423	20. 6	7, 150

EXTRACTION OF MINERALS INDUSTRIES

Extraction of Minerals Industries

The extraction of minerals industries were represented by 6,777 workers in 42 mines and plants. The chief extraction of minerals industry in Illinois is the mining of bituminous coal. Therefore, the study of this industry was concentrated in this classification where 5,885 workers were surveyed.

Exposures to Specified Materials: Of the 6,777 workers in these industries, 95.7 per cent were exposed and each exposed worker averaged 2.6 exposures to specified materials. The major exposures were bituminous coal dust, gases and carbon monoxide. It was found that 23 of the 49 specified materials, used to record exposures, occurred in this industry. Table 18 reveals the number and per cent of workers exposed to specified materials in the extraction of minerals industries. This data was expected because of the large number of workers surveyed in the bituminous coal industry, where it was found that 94 per cent of workers surveyed were exposed to bituminous coal dust, 74.5 per cent exposed to carbon monoxide, and 74.5 per cent exposed to gases. These exposures have long been recognized as the hazards of this industry. Table 19 reveals the number and percentage of total exposures to the specified materials. Of interest is the data showing that 98.3 per cent of all bituminous coal dust exposures, 99.8 per cent of all carbon monoxide exposures and 98.3 per cent of all gas exposures were in the bituminous coal mines. This is due to the large sample taken of this industry. This table further shows that 99.0 per cent of the silica dust exposures were in the "other mines" classification. In this group are the fluorspar and silica mines and quarries. Table 20 reveals the major exposures of the chief occupations in the bituminous coal industry.

TABLE 18—EXTRACTION OF MINERALS—EXPOSURE TO SPECIFIED MATERIALS

Materials	All extraction of minerals industries in survey		Number and percent of workers exposed					
			Coal mines		Other mines		Quarries	
	No.	%	No.	%	No.	%	No.	%
Total number of workers.....	6,777		5,885		836		56	
Number of plants.....	42		24		16		2	
Acids, mineral.....	10	*	5	*	5	0.6		
Alkalies.....	10	*	2	*	8	1.0		
Chemicals.....	10	*	5	*	5	0.6		
Cyanides.....	2	*	2	*				
Coal dust, bituminous.....	5,571	82.3	5,531	94.0	40	4.8		
Silica dust.....	291	4.3	3	*	288	34.4		
Silicate dust.....	763	11.3	649	11.0	114	13.7		
Non-siliceous dust.....	93	1.5	39	0.7	21	2.5	38	67.9
Organic dust.....	26	*	19	*	7	0.8		
Dermatitis.....	16	*	16	*				
Fluorides.....	266	3.9			266	31.9		
Carbon monoxide.....	4,380	64.7	4,371	74.5	6	0.7	3	5.4
Other gases.....	4,401	65.1	4,393	74.5	5	0.6	3	5.4
Chromium.....	3	*	3	*				
Lead.....	7	*	7	*				
Other metals.....	135	2.0	134	2.3	1	*		
Nitrogen oxides.....	685	10.1	685	11.7				
Infection.....	82	1.2	82	1.4				
Lacquer.....	7	*	7	*				
Organic solvents.....	6	*	6	*				
Petroleum.....	129	1.9	129	2.2				
Paint.....	15	*	3	*	12	1.4		
Other salts.....	46	0.7	46	0.8				

*—Denotes less than $\frac{1}{2}$ of 1%.

Control Measures: Table 21 reveals the extent to which control measures have been applied in the extraction of minerals industries. Positive ventilation, due to the ventilation of mines, was found to be the most prevalent type of control measure. It appears that the application of the other indicated control measures have not been as widely accepted in this industry. Table 22 reveals the extent to which the indicated control measures have been applied in the bituminous coal industry. Positive ventilation was found to be the most prevalent type of control, which is supplied by means of ventilating mine shafts. There appears to be a need for the wider application of control measures for the exposures of this industry.

TABLE 19—EXTRACTION OF MINERALS—EXPOSURES TO SPECIFIED MATERIALS

Materials	All extraction of minerals industries in survey	Number and percentage of total exposures to the specified materials					
		Bituminous Coal mines		Other mines		Quarries	
		No.	%	No.	%	No.	%
Total number of workers.....	6777	5985		836		56	
Total number of exposures.....	16959	16137		778		44	
Acids, mineral.....	10	5	50.0	5	50.0		
Alkalies.....	10	2	20.0	8	80.0		
Chemicals.....	10	5	50.0	5	50.0		
Cyanides.....	2	2	100.0				
Coal dust, bituminous.....	5,571	5,531	98.3	40	0.7		
Silica dust.....	291	3	1.0	288	99.0		
Silicate dust.....	768	649	85.1	114	14.9		
Non-siliceous dust.....	98	39	39.8	21	21.4	38	38.8
Organic dust.....	26	19	73.1	7	26.9		
Dermatitis.....	16	16	100.0				
Fluorides.....	266			266	100.0		
Carbon monoxide.....	4,390	4,371	99.8	6	0.1	3	0.1
Other gases.....	4,401	4,393	99.8	5	0.1	3	0.1
Chromium.....	3	3	100.0				
Lead.....	7	7	100.0				
Other metals.....	135	134	99.3	1	0.7		
Nitrogen Oxides.....	685	685	100.0				
Infection.....	82	82	100.0				
Lacquer.....	7	7	100.0				
Organic solvents.....	6	6	100.0				
Petroleum.....	129	129	100.0				
Paint.....	15	3	20.0	12	80.0		
Other salts.....	46	46	100.0				

TABLE 20—MAJOR EXPOSURES OF THE CHIEF OCCUPATIONS IN THE BITUMINOUS COAL INDUSTRY

Number of Workers in Survey.....	5,885
Number of Workers Exposed.....	5,762
Percent of Workers Exposed.....	98.0%
Number of Exposures per Person Exposed.....	2.8

Occupation	Bituminous coal dust	Other gases	Carbon monoxide	Nitrogen oxides	Silicate dust	Other metals	Infection	Non-siliceous dust
Number of workers exposed.....	5,531	4,393	4,371	685	649	134	82	39
Percent of workers exposed.....	93.8	74.5	74.2	11.6	11.0	2.3	1.4	0.7
Miners, (drillers) (machine men).....	●	●	●	●	●			●
Motormen and helpers (trip riders).....	●	●	●		●			
Track men (track layers).....	●	●	●		●			
Loaders and helpers (machine and hand loaders).....	●	●	●					
Timbermen.....	●	●	●					
Laborers (clean-up gang).....	●	●	●		●			
Pickers.....	●	●	●					
Shot firers.....	●	●	●	●				
Tippie men.....	●	●	●			●		
Blacksmith.....	●	●	●				●	
Mule drivers.....	●	●	●				●	

TABLE 21—PERCENT OF WORKERS EXPOSED TO SPECIFIED MATERIALS HAVING INDICATED TYPE OF HAZARD CONTROL—EXTRACTION OF MINERALS

Materials	Number of exposures	Percent of exposed workers having specified control								
		Positive ventilation	Negative ventilation	Local exhaust	Isolation	Wet method	Gas masks	Respirators	Pressure helmets	Other
All specified materials...	16,959	64.8	16.0	1.5		2.4		1.9		
Coal dust, bituminous...	5,571	60.8	17.9			0.5		2.3		
Other gases...	4,401	76.8	14.4	0.3						
Carbon monoxide...	4,380	77.4	14.5	0.4						
Silicate dust...	763	13.9	48.4	1.1		4.2		1.6		
Nitrogen oxides...	685	73.0	3.0							
Silica dust...	291			33.3		33.3		58.6		
Fluorides...	266	45.5	1.1	36.5		91.0		0.8		
Other metals...	135	17.8		5.2				0.7		
Petroleum...	129	17.0	7.8							
Non-siliceous dust...	98			7.1	2.1	1.0		11.3		
Infection...	82	67.2	36.6							
Other salts...	46									
Organic dust...	26	15.4						11.5		
Dermatitis...	16									
Paint...	15									
Acids, mineral...	10		50.0							
Alkalies...	10		30.0							
Chemicals...	10		30.0							
Lead...	7									
Lacquer...	7									
Organic solvents...	6									
Chromium...	3									
Cyanide...	2			100.0						

TABLE 22—PERCENT OF WORKERS EXPOSED TO SPECIFIED MATERIALS HAVING INDICATED TYPE OF HAZARD CONTROL—BITUMINOUS COAL MINES

Materials	Number of exposures	Percent of exposed workers having specified control								
		Positive ventilation	Negative ventilation	Local exhaust	Isolation	Wet method	Gas masks	Respirators	Pressure helmets	Other
All specified materials...	16,137	67.4	16.7	0.3		0.2		0.8		
Coal dust, bituminous...	5,531	61.2	18.0			0.5		2.3		
Other gases...	4,393	76.8	14.4	0.3						
Carbon monoxide...	4,371	77.3	14.5	0.4						
Nitrogen oxides...	685	72.8	2.5							
Silicate dust...	649	16.3	56.8	0.3		1.2		0.3		
Other metals...	134	17.9		5.2				0.8		
Petroleum...	129	17.1	7.8							
Infection...	82	67.0	36.6							
Other salts...	46									
Non-siliceous dust...	39			7.7				2.6		
Organic dust...	19	21.0						10.5		
Dermatitis...	16									
Lead...	7									
Lacquer...	7									
Organic solvents...	6									
Acids, mineral...	5									
Chemicals...	5									
Silica dust...	3									
Chromium...	3									
Paint...	3									
Alkalies...	2									
Cyanide...	2			100.0						

CHEMICAL AND ALLIED INDUSTRIES

Chemical and Allied Industries

The chemical and allied industries were represented by 17,950 workers in 289 plants. The greatest number of workers surveyed was in the baking powder, starch, etc., and chemicals and dyes industries. Of these 17,950 workers, 73.7 per cent were exposed, and each exposed worker averaged 2.5 exposures to specified materials. The major exposures were organic dust, organic solvents and alkalies. It was found that 46 of the 49 specified materials, used to record exposures, occurred in these industries. Table 23 reveals the number and per cent of workers exposed to specified materials. A major reason for the large exposure to organic dust was the large number of workers surveyed in the baking powder industry. Table 24 reveals the number and percentage of total exposures to specified materials. The greatest exposure to organic dust was found to be in the baking powder industry; the greatest exposure to organic solvents in the paint and varnish, and petroleum industries; and the greatest exposure to alkalies in the soap, and chemicals and dyes industries.

Table 25 reveals the extent to which indicated control measures have been applied in the chemical and allied industries. Local exhaust ventilation was found to be the most prevalent type of control measure in these industries. None of the indicated control measures appear to have a wide application.

Charcoal and Coke Industry: The charcoal and coke industry was represented by 403 workers in two plants. Of these 403 workers, 83.0 per cent were exposed and each exposed worker averaged 3.3 exposures to specified materials. The major exposures were organic dust, bituminous coal dust, gases and carbon monoxide. It was found that 18 of the 49 specified materials, used to record exposures, occurred in this industry. Table 26 reveals the major exposures of the chief occupations in this industry. Table 27 reveals the extent to which control measures have been applied. Recognized control measures did not appear to have any wide application.

Explosives, Fireworks and Match Industry: The explosives, match and fireworks industry was represented by 879 workers in seven plants. Of these 879 workers, 66.9 per cent were exposed, and each exposed worker averaged 1.5 exposures to specified materials. The major exposures in this industry were dermatitis producers, organic dust and alcohols, esters, ethers. It was found that 29 of the 49 specified materials, used to record exposures, occurred in this industry. Table 28 reveals the major exposures in the chief occupations of this industry. Table 29 reveals the extent to which control measures have been applied. It appears that a wider use of these recognized control measures could be applied in this industry.

Fertilizer Industry: The fertilizer industry was represented by 250 workers in five plants. Of these 250 workers, 99.5 per cent were exposed, and each exposed worker averaged 3.2 exposures to specified materials. The major exposures were salts, non-siliceous dust, amines and alkalies. It was found that 16 of the 49 specified materials, used to record exposures, occurred in this industry. Table 30 reveals the major exposures of the chief occupations of this industry. Table 31 reveals the extent to which recognized control measures have been applied. Respirators are the most prevalent type of control measure in this industry.

Gas Works: The gas works industry was represented by 86 workers in two plants. This sample was not deemed of sufficient size to make any analyses.

Paint, Lacquer and Varnish Industry: The paint, lacquer and varnish industry was represented by 1,878 workers in 66 plants. Of these 1,878 workers, 75.9 per cent were exposed, and each exposed worker averaged 4.2 exposures to specified materials. The major exposures were organic solvents, lead, paint and "other metals." It was found that 38 of the 49 specified materials, used for recording exposures, occurred in this industry. Table 32 reveals the major exposures of the chief occupations in this industry. Table 33 reveals the extent to which recognized control measures have been applied. Local exhaust ventilation and respirators were found to be the most prevalent types of control measures.

Petroleum Refineries: The petroleum refining industry was represented by 1,391 workers in six plants. Of these 1,391 workers, 91.0 per cent were exposed, and each exposed worker averaged 3.8 exposures to specified materials. The major exposures were petroleum, organic solvents, and gases. It was found that 24 of the 49 specified materials, used to record exposures, occurred in this industry. Table 34 reveals the major exposures in the chief occupations of this industry. Table 35 reveals the extent to which recognized control measures have been applied. Isolation and respirators were found to be the most prevalent types of control measures.

Rayon (Viscose) Industry: In reality, there are no rayon plants in Illinois. However, there are a few plants manufacturing synthetic materials by the viscose process. These plants can rightfully be placed in the rayon classification as the processing is identical with rayon. The only difference is the machine through which the viscose is extruded. In rayon manufacture, spinnerettes are used, while in synthetic material plants, slotted rings or other dies are used. The coagulating medium is identical with rayon manufacture. Upon this basis, the rayon industry was represented by 680 workers in two plants. Of these 680 workers, 36.8 per cent were exposed and each exposed worker averaged 1.9 exposures to specified materials. The major exposures were hydrogen sulfide, sulfur dioxide and mineral acids. It was found that 16 of the 49 specified materials used to record exposures, occurred in this industry. Table 36 reveals the major exposures of the chief occupations in this industry. Table 37 reveals the extent to which recognized control measures have been applied. Local exhaust ventilation, positive mechanical ventilation and isolation were found to be the most prevalent types of control measures. It will be noticed that carbon disulphide which is one of the most important exposures of the rayon industry, has not been specifically noted. This is due to the fact that U. S. Census data revealed no rayon plants in Illinois. Therefore, in making up the list of 49 material classifications, carbon disulphide was not made a specific material but given the general classification of organic solvents. When these plants did occur, it was too late in the study to make a specific mention of carbon disulphide without re-editing the previous surveys for this material.

Soap Industry: The soap industry was represented by 895 workers in 14 plants. Of these 895 workers, 65.1 per cent were exposed and each exposed worker averaged 1.8 exposures to specified materials. The major exposure of this industry was alkalis. It was found that 27 of the 49 specified materials, used to record exposures, occurred in this industry. Table 38 reveals the major exposures of the chief occupations in this industry. Table 39 reveals the extent to which control measures have been applied. Respirators and local exhaust ventilation were found to be the most prevalent types of control measures in this industry.

Baking Powder and Starch Industry: The baking powder and starch industry was represented by 3,066 workers in four plants. Of these 3,066 workers, 84.0 per cent were exposed, and each exposed worker averaged 1.6 exposures to

specified materials. The major exposures were organic dust, sulfur dioxide and dermatitis producers. It was found that 33 of the 49 specified materials, used to record exposures, occurred in this industry. Table 40 reveals the major exposures of the chief occupations in this industry. Table 41 reveals the extent to which control measures have been applied. Local exhaust and general exhaust ventilation were the most prevalent types of control measures in this industry.

Blackening and Stain Industry: The blackening and stain industry was represented by 50 workers in five plants. This sample was not deemed of sufficient size to make any analyses.

Carbon Paper, Ink, etc., Industry: The carbon paper, ink and inked ribbon industry was represented by 673 workers in 24 plants. Of these 673 workers, 78.5 per cent were exposed, and each exposed worker averaged 3.4 exposures to specified materials. The major exposures were organic solvents, ink and dyes. It was found that 33 of the 49 specified materials, used to record exposures, occurred in this industry. Table 42 reveals the major exposures of the chief occupations in this industry. Table 43 reveals the extent to which control measures have been applied. Negative general ventilation was found to be the most prevalent type of control measures in this industry.

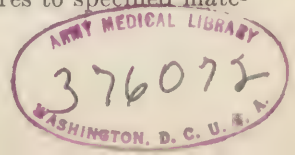
Chemicals and Dyes Industry: The chemicals and dye industry was represented by 2,758 workers in 24 plants. Of these 2,758 workers, 76.3 per cent were exposed and each exposed worker averaged 2.3 exposures to specified materials. The major exposures were "other metals," alkalies, and mineral acids. It was found that 42 of the 49 specified materials, used to record exposures, occurred in this industry. Table 44 reveals the major exposures of the chief occupations in this industry. Table 45 reveals the extent to which control measures have been applied. Isolation and local exhaust ventilation were found to be the most prevalent types of control measures in this industry.

Compressed Gas Industry: The compressed gas industry was represented by 96 workers in nine plants. These were not deemed a sample of sufficient size upon which to base an analyses of the industry.

Cleaning and Polishing Materials Industry: The cleaning and polishing materials industry was represented by 337 workers in 14 plants. Of these 337 workers, 59.7 per cent were exposed, and each exposed worker averaged 4.2 exposures to specified materials. The major exposures were alkalies, petroleum and organic solvents. It was found that 27 of the 49 specified materials, used to record exposures, occurred in this industry. Table 46 reveals the major exposures in the chief occupations in this industry. Table 47 reveals the extent to which control measures have been applied. Negative general ventilation was found to be the most prevalent type of control measure.

Drugs and Patent Medicine Industry: The drug and patent medicine industry was represented by 1,160 workers in 22 plants. Of these 1,160 workers, 79.8 per cent were exposed, and each exposed worker averaged 2.6 exposures to specified materials. The major exposures were medicinal compounds, organic dust, and alcohols, esters and ethers. It was found that 37 of the 49 specified materials, used to record exposures, occurred in this industry. Table 48 reveals the major exposures of the chief occupations in this industry. Table 49 reveals the extent to which control measures have been applied. Local exhaust ventilation was found to be the most prevalent type of control measure in this industry.

Glue, Paste and Gelatin Industry: The glue, paste and gelatin industry was represented by 268 workers in 14 plants. Of these 268 workers, 67.6 per cent were exposed, and each exposed worker averaged 1.9 exposures to specified mate-



rials. The chief exposures were organic dust and dermatitis producers. It was found that 30 of the 49 specified materials, used to record exposures, occurred in this industry. Table 50 reveals the major exposures of the chief occupations in this industry. Table 51 reveals the extent to which control measures have been applied. Negative general ventilation, local exhaust ventilation and respirators were found to be the most prevalent types of control measures in this industry.

Grease and Tallow Industry: The grease and tallow industry was represented by 257 workers in 9 plants. Of the 257 workers, 86.0 per cent were exposed, and each exposed worker averaged 1.9 exposures to specified materials. The major exposures were infections, petroleum and organic dust. It was found that 24 of the 49 specified materials, used to record exposures, occurred in this industry. Table 52 reveals the major exposures of the chief occupations in this industry. Table 53 reveals the extent to which control measures have been applied. Local exhaust and negative general ventilation were found to be the most prevalent types of control measures in this industry.

Non-Petroleum Oils: The non-petroleum oil industry was represented by 286 workers in 10 plants. Of these 286 workers, 90.4 per cent were exposed, and each exposed worker averaged 1.9 exposures to specified materials. The major exposures were oil and organic dust. It was found that 22 of the 49 specified materials, used to record exposures, occurred in this industry. Table 54 reveals the major exposures of the chief occupations in this industry. Table 55 reveals the extent to which control measures have been applied. Local exhaust ventilation and isolation were found to be the most prevalent types of control measures in this industry.

Perfume and Cosmetic Industry: The perfume and cosmetic industry was represented by 966 workers in 23 plants. Of these 966 workers, 53.0 per cent were exposed, and each exposed worker averaged 2.7 exposures to specified materials. The major exposures were alcohols, esters and ethers, and oils. It was found that 31 of the 49 specified materials, used to record exposures, occurred in this industry. Table 56 reveals the major exposures of the chief occupations in this industry. Table 57 reveals the extent to which control measures have been applied. Local exhaust ventilation and respirators were found to be the most prevalent types of control measures.

TABLE 23—CHEMICAL AND ALLIED INDUSTRY—EXPOSURE TO SPECIFIED MATERIALS

Materials	All chemical and allied industries in survey	Number and percent of workers exposed																																										
		Charcoal and coke works		Explosives ammunition and fireworks		Fertilizer factories		Gas works		Paints and varnish		Petroleum refineries		Rayon (Viscose)		Soap factories		Baking powder, etc.		Blackings, stains, etc.		Carbon paper, inked ribbons, ink, etc.		Chemicals, dyes, etc.		Gases compressed except gas works		Cleaning, polishing solutions		Drugs and patent medicine		Glue, paste, mucilage, etc.		Greases, tallow, etc.		Oils, (not including petroleum products)		Cosmetics, perfumes, etc..		Others				
Total number of workers...	17,950	403		879		250		86		1,878		1,391		680		895		3,066		50		673		2,758		96		337		1,160		268		257		286		966		1,571				
Number of plants.....	289	2		7		5		2		66		6		2		14		4		5		24		24		9		14		22		14		9		10		23		27				
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%				
Acids, organic.....	296	1.7			3	*					7	*					62	2.1	9	18.0	17	2.5	46	1.7			5	1.5	47	4.0	5	1.9			12	4.2	38	3.9	45	2.9				
Acids, mineral.....	1495	8.3	6	1.5	26	3.0	10	4.0	5	5.8	50	2.9	289	20.8	96	14.1	25	2.8	279	9.1			6	0.9	483	18.2		14	4.1	118	10.2	9	3.4	7	2.7	17	5.9	13	1.4	42	2.7			
Aldehydes.....	257	1.4			7	0.8					98	5.2	9	0.7			1	*	5	*			16	2.4				4	1.2	5	*	19	7.0	4	1.6			87	5.5					
Alkalies.....	2412	13.4	6	1.5	23	2.6	104	41.6	1	1.2	65	3.5	261	18.7	28	4.1	482	54.0	119	3.9	4	8.0	41	6.1	700	25.4	2	2.0	103	30.6	113	9.8	21	7.8	14	5.4	35	12.2	134	13.9	155	10.0		
Anilines.....	123	0.7									55	2.9					2	*					10	1.5	33	1.2		6	1.7	9	0.8								8	0.5				
Amines.....	234	1.3				110	44.1				4	*								9	18.0						56	16.6	40	3.5			1	*			10	1.0	3	*				
Chemicals.....	519	2.9	6	1.5	14	1.6	3	1.2	1	1.2	48	2.6	38	2.7	13	1.9	14	1.6	109	3.5			17	2.5	99	3.6		7	2.1	58	5.0	14	5.2	8	3.1	15	5.3	17	1.8	38	3.4			
Coal tar products.....	836	4.7	97	24.0	20	2.3	3	1.2	15	17.4	140	7.4	11	0.8			6	0.7	20	0.7			17	2.5	141	5.1		5	1.5	55	4.7	20	7.5	2	0.8	8	2.8	29	3.0	250	15.9			
Cyanides.....	24	*			1	*					5	*							4	*			5	0.7	1	*															1	*		
Asbestos.....	159	0.9									118	6.3	23	1.7					8	*																				3	*			
Coal dust, bituminous.....	602	3.4	208	51.6				21	24.2		13	0.7	2	*			14	1.6	114	3.7			8	1.2	116	4.2		4	1.2	16	1.4	13	4.9			25	9.7	16	5.6		*	31	2.0	
Silica dust.....	555	3.1	18	4.5	3	*					174	9.3	129	9.3	1	*	79	8.8	62	2.0			5	0.7	49	1.8		16	4.8			15	5.2	2	0.8	34	13.2	22	7.7	125	12.9	71	4.5	
Silicate Dust.....	833	4.6	38	9.4	7	0.8		3	3.5		130	6.9	97	6.9			51	5.7	75	2.4			20	3.0	97	3.6	10	10.4	12	3.6	27	2.3	14	5.2	34	13.2	7	2.5	39	4.0	72	4.6		
Non-siliceous dust.....	923	5.1	20	4.9	10	1.1	184	73.6			290	15.4	25	1.8			15	0.5			31	4.6	165	6.0			12	3.6	30	2.6	15	5.6	8	3.1	7	2.5	39	4.0	72	4.6				
Organic dust.....	3363	18.8	221	54.9	81	9.2	75	30.0	15	17.4	271	14.4	14	1.0	6	0.9	52	5.8	1525	49.7	5	10.0	100	15.0	105	3.8		75	22.2	266	22.9	76	28.3	45	17.5	118	41.3	121	12.5	192	12.2			
Dye.....	570	3.2								101	5.4			3	*	17	1.9	3	*	26	52.3			183	27.2			68	20.2	23	2.0	1	*			8	3.1	68	9.1	26	1.7			
Dermatitis.....	1083	6.1	13	3.2	291	33.2	2	0.8	1	1.2	11	0.6	38	2.7	86	12.6	69	7.7	346	11.3	2	4.0			34	1.2		10	2.9	84	7.2	25	9.3	9	3.5	6	2.1	20	2.1	36	2.3			
Fluorides.....	230	1.3				5	2.0												3	*					185	6.7					5	*	2	0.8			2	0.7	22	2.3	6	0.6		
Carbon monoxide.....	470	2.6	129	32.0	15	1.7	1	*	23	26.8	39	2.0	139	10.0	4	0.6	24	0.8			2	2.0	4	0.6					1	*							4	1.5						
Hydrogen sulphide.....	186	1.0								8	0.3	8	*			113	16.6							75	2.7					2	*	3	1.1			22	8.6							
Sulphur dioxide.....	689	3.8				4	1.6	2	2.3	8	*			92	13.5			413	13.4					166	6.0					4	1.6													
Other gases.....	1685	9.4	196	48.7	15	1.7	71	28.4	25	29.1	36	1.9	907	65.1	6	0.9	10	1.1			4	0.6			178	6.5	52	54.3	78	23.2	18	1.6	6	2.5			7	2.4	8	0.8	40	2.5		
Chlorine.....	183	1.0									4	*					8	0.9	19	0.6					93	3.3			13	3.9	40	3.5	1	*							5	*		
Arsenic.....	44	*																																										
Chromium.....	499	2.8		5	0.6						320	17.0							1	*			119	17.7							5	*												
Cadmium.....	114	0.6									89	4.7											2	*																				
Mercury.....	67	0.4			21	2.4																	2	*							26	2.2	4	1.5										
Manganese.....	142	0.8		4	0.5						78	1.2											8	1.2	49	1.8					1	*												
Lead.....	1330	7.4	3	0.7	15	1.7		2	2.3	621	33.1	235	16.9	2	*	28	3.1	114	3.7			143	21.3	121	4.3					8	0.7			1	*					6	0.6	31	2.0	
Radioactive material.....	90	0.5																																										
Antimony.....	67	0.4		21	2.4					5	*					2	*	2	*			4	0.6	12	0.4					7	0.6													
Other metals.....	1797	10.0	15	3.7	37	4.2	3	1.2	5	5.8	416	22.2	107	7.7	1	*	11	1.2	74	2.4	6	12.0	78	11.6	821	29.8	7	7.3	16	4.8	59	5.0	1	*	2	0.8	3	1.0	83	8.6	1	*	52	3.3
Nitrogen oxides.....	41	*																																										
Infection.....	221	1.2																																										
Alcohols, esters and ether.....	1214	6.8		73	8.3	2	0.8				252	13.4	189	13.6			10	1.1	49	1.6	4	8.0	19	2.8	15	0.5	2	2.0	72	21.4	54	4.7	23	8.6	115	44.8	1	*			25	1.6		
Halogenated hydrocarbons.....	254	1.4		27	3.0			2	2.3		11	0.6					3	*			16	32.0	42	6.3	69	2.6			13	3.9	207	17.8	8	3.0			</							

TABLE 24—CHEMICAL AND ALLIED INDUSTRIES—EXPOSURES TO SPECIFIED MATERIALS

Materials	All chemical and allied industries in survey	Number and percentage of total exposures to the specified materials																																									
		Charcoal and coke works		Explosives ammunition and fire works		Fertilizer factories		Gas works		Paint and varnish		Petroleum refineries		Rayon (Viscose)		Soap factories		Baking powder, etc.		Blackings, stains, etc.		Carbon paper, inked ribbons, ink, etc.		Chemicals dyes, etc.		Gases compressed except gas works		Cleaning, polishing, etc., and solutions (not organic solvents)		Drugs and patent medicine		Glue, paste, mucilage, etc.		Greases, tallow, etc.		Oils, (not including petroleum) products		Cosmetics, perfumes, etc.		Others			
		No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%		
Total number of workers...	17,950	403		879		250		86		1,878		1,391		680		895		3,066		50		673		2,758		96		337		1,160		268		257		286		966		1,571			
Total number of exposures...	33,762	1,102		851		805		139		6,014		4,752		469		1,071		4,180		138		1,790		4,732		94		849		2,422		336		429		482		1,362		1,745			
Acids, organic	296			3	1.0					7	2.3							62	21.0	9	3.0	17	5.7	46	15.6			5	1.7	47	15.9	5	1.7			12	4.1	38	12.8	45	15.2		
Acids, mineral	1,495	6	0.4	26	1.7	10	0.7	5	0.3	50	3.3	289	19.3	96	6.4	25	1.7	279	18.7			6	0.4	483	32.3			14	0.9	118	7.9	9	0.6	7	0.5	17	1.1	13	0.9	42	2.8		
Aldehydes	257			7	2.6					98	38.2	9	3.5			1	0.4	5	1.9			16	6.2	2	0.8			4	1.6	5	2.0	19	7.4	4	1.6			87	33.8				
Alkalies	2,412	6	0.2	23	1.0	104	4.1	1	*	65	2.7	261	10.8	28	1.2	482	20.0	119	4.9	4	0.2	41	1.7	700	29.1	2	0.1	103	4.2	113	4.7	21	0.9	14	0.6	35	1.5	134	5.6	155	6.4		
Anilines	123									55	44.7					2	1.7					10	8.1	33	26.8			6	4.9	9	7.3					10	4.3	3	1.3				
Amines	234					110	47.0			4	1.7									9	3.9			1	0.4			56	23.9	40	17.1			1	0.4			17	3.3				
Chemicals	519	6	1.1	14	2.7	3	0.6	1	0.2	48	9.3	38	7.3	13	2.5	14	2.7	109	20.9			17	3.3	99	19.1			7	1.4	58	11.2	14	2.7	8	1.5	15	2.9	17	3.3				
Coal tar products	836	97	11.6	20	2.3			15	1.8	140	16.8	11	1.3			6	0.7	20	2.4			17	2.0	141	16.9			5	0.6	55	6.6	20	2.4	2	0.2	8	1.0	29	3.5				
Cyanides	24			1	4.2					5	20.8	2	8.3					4	16.7			5	20.8	1	4.2					5	20.8							250	29.9				
Asbestos	159									118	74.2	23	14.4					8	5.1					7	4.4												3	1.9					
Coal dust, bituminous	602	208	34.6					21	3.5	13	2.2	2	0.3			14	2.3	114	18.9			8	1.3	116	19.2			4	0.7	16	2.7	13	2.2	25	4.2	16	2.7	1	0.2	31	5.0		
Silica Dust	555	18	3.2	3	0.5					174	31.5	129	23.2	1	0.2	79	14.2	62	11.2			5	0.9	49	8.8			16	2.9	27	3.2	14	1.7	34	4.1	22	2.6	125	15.0				
Silicate dust	833	38	4.6	7	0.8			3	0.4	130	15.6	97	11.6			51	6.3	75	9.0			20	2.4	97	11.6	10	1.2	12	1.4	34	4.1	14	1.7	34	4.1	22	2.6	125	15.0				
Non-siliceous dust	923	20	2.2	10	1.1	184	19.9			290	31.4	25	2.6			15	1.6	15	1.6			31	3.4	165	17.9			12	1.3	30	3.3	15	1.6	8	0.9	7	0.8	39	4.2				
Organic dust	3,363	221	6.8	81	2.4	75	2.4	15	0.5	271	8.1	14	0.4	6	0.2	52	1.6	1525	45.4	5	0.2	100	2.9	105	3.1			75	2.2	266	7.9	76	2.7	45	1.3	118	3.5	121	3.6				
Dye	570									101	17.6			3	0.5	17	3.0	3	0.5	26	4.6	183	32.1	23	4.0			68	11.9	23	4.0	1	0.2	8	1.4			88	15.4				
Dermatitis	1,083	13	1.2	291	26.6	2	0.2	1	0.1	11	1.0	38	3.5	86	7.9	69	6.7	346	31.9	2	0.2			34	3.1			10	0.9	84	7.8	25	2.3	9	0.8	6	0.6	20	1.9				
Fluorides	230					5	2.0									3	1.3							185	80.5					5	2.2	2	0.9			2	0.9			22	9.6		
Carbon monoxide	470	129	27.4	15	3.4	1	0.2	23	4.9	39	8.3	139	29.6	4	0.9	10	2.1	2	0.4	1	0.2	4	0.8	75	15.9			1	0.2	1	0.2	1	0.2	5	1.1	6	1.3	4	0.9	10	2.1		
Hydrogen Sulphide	186							8	4.3	8	4.3			113	60.8			24	12.9			6	3.2	166	24.1			2	1.1	3	1.6	22	11.8										
Sulphur dioxide	689					4	0.6	2	0.3	8	1.2			92	13.5			413	59.9					4	0.6					4	0.6												
Other gases	1,695	196	11.6	15	0.9	71	4.2	25	1.5	36	2.1	907	53.9	6	0.4	10	0.6	27	1.6	1	0.7	4	0.2	178	10.5	52	3.1	78	4.8	18	1.1	6	0.4			7	0.4	8	0.5				
Chlorine	183									4	2.2					8	4.4	19	10.4					44	100.0			13	7.1	40	21.8	1	0.6							5	2.7		
Arsenic	44																	1	0.2			119	23.8	28	5.6					5	1.0									21	4.2		
Chromium	499			5	1.1					320	64.1											2	1.7	9	7.9																3	2.6	
Cadmium	114									89	78.1											2	3.0							26	38.8	4	6.0					11	9.6				
Mercury	67			21	31.3																	8	5.6	49	34.5					1	0.7									2	1.4		
Manganese	142			4	2.9					78	54.9											143	10.8	121	9.1					8	0.6					1	0.1			6	0.5		
Lead	1,330	3	0.2	15	1.1			2	0.2	621	46.7	235	17.9	2	0.2	28	2.1	114	8.5					90	100.0																		
Radioactive material	90																					4	5.9	12	17.9					7	10.4											13	19.4
Antimony	67			21	31.4					5	7.5					2	3.0	2	3.0					90	100.0																		
Other metals	1,797	15	0.8	37	2.1	3	0.2	5	0.3	416	23.2	107	5.9	1	0.1	11	0.6	74	4.1	6	0.3	78	4.3	821	45.7	7	0.4	16	0.9	59	3.3	1	0.7	2	0.1	3	0.2	83	4.6	52	2.9		
Nitrogen Oxides	41																							39	95.1																		
Infection	221																							15	1.2			2	0.2	72	5.9	207	17.1	8	0.7	1	0.1			253	20.8		
Alcohols, esters and ether	1,214			73	6.0	2	0.2			252	20.7	189	15.6					49	4.0			19	1.6	69	27.1			13	5.1	29	11.5	2	0.8									37	14.6
Halogenated Hydrocarbons	254			27	10.6			2	0.8	11	4.3																																

TABLE 25—PERCENT OF WORKERS EXPOSED TO SPECIFIED MATERIALS HAVING INDICATED TYPE OF HAZARD CONTROL—CHEMICAL AND ALLIED INDUSTRIES

Materials	Number of exposures	Percent of exposed workers having specified control								
		Positive ventilation	Negative ventilation	Local exhaust	Isolation	Wet method	Gas masks	Respirators	Pressure helmets	Other
All Specified Materials ..	33,762	1.5	5.7	13.2	7.2	1.3	1.1	7.5	1.2	4.3
Organic dust	3,363	0.6	3.6	24.1	1.1	0.3	-----	8.3	-----	0.5
Organic solvents	2,822	0.4	5.5	6.9	13.7	-----	1.8	11.0	-----	4.3
Alkalies	2,412	1.7	6.2	11.4	15.5	2.1	2.1	6.8	2.1	10.6
Petroleum	1,861	1.2	5.6	2.5	-----	-----	-----	13.8	-----	5.3
Other metals	1,797	0.9	1.8	13.5	8.8	-----	0.1	12.5	1.0	0.6
Other gases	1,685	0.2	4.8	19.2	22.8	9.9	3.5	1.1	3.0	0.5
Acids, mineral	1,495	5.0	5.1	21.0	17.8	-----	3.3	1.0	3.3	12.2
Oil	1,388	0.1	2.9	3.9	6.2	-----	-----	0.9	0.1	4.3
Lead	1,330	0.8	2.5	11.3	1.0	-----	-----	12.2	3.8	8.5
Alcohols, esters and ether ..	1,214	3.5	13.1	11.5	2.9	0.3	3.8	1.8	4.1	7.3
Dermatitis	1,083	0.2	2.3	-----	-----	-----	4.6	-----	-----	0.9
Non-siliceous dust	923	-----	0.3	20.3	1.2	1.1	12.3	17.4	-----	0.2
Coal tar products	836	1.3	5.9	12.3	8.9	-----	-----	7.7	0.1	7.9
Silicate dust	833	0.2	4.4	12.6	1.4	8.6	-----	-----	-----	-----
Other salts	818	1.5	3.9	7.2	5.5	0.4	-----	7.8	-----	3.2
Medicinals	804	0.9	2.7	7.3	10.3	-----	-----	1.5	-----	0.1
Lacquer	758	0.1	3.8	8.5	0.6	-----	-----	3.2	-----	1.9
Sulphur dioxide	689	8.7	34.8	30.5	14.8	-----	-----	1.5	-----	2.2
Paint	680	0.2	4.6	6.0	1.1	0.1	-----	3.1	-----	5.0
Sulphur	631	0.3	2.7	7.8	12.5	2.5	7.9	7.1	-----	12.5
Coal dust, bituminous	602	-----	1.5	-----	3.3	13.5	-----	4.2	-----	-----
Dye	570	2.1	21.2	3.9	4.0	2.5	-----	8.1	0.2	7.4
Silica dust	555	-----	5.2	21.8	4.2	2.0	-----	25.7	22.7	-----
Chemicals	519	4.6	9.5	1.7	-----	-----	-----	1.2	-----	1.2
Chromium	499	-----	3.8	13.6	0.2	3.0	-----	20.2	-----	7.2
Carbon monoxide	470	0.9	2.1	56.6	9.6	-----	-----	-----	-----	-----
Ink	379	2.9	6.9	-----	-----	0.3	-----	-----	-----	-----
Acids, organic	296	-----	2.7	29.1	0.3	-----	-----	7.1	-----	8.5
Aldehydes	257	-----	14.4	47.0	7.4	-----	-----	5.9	-----	2.0
Halogenated	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
hydrocarbons	254	0.8	10.6	13.8	9.1	-----	-----	3.5	-----	2.8
Amines	234	2.1	24.8	0.4	-----	-----	-----	12.8	-----	1.2
Fluorides	230	-----	3.1	27.4	13.9	0.4	-----	5.1	-----	12.2
Infection	221	11.3	16.3	1.4	-----	-----	-----	1.4	-----	8.2
Hydrogen sulphide	186	25.3	14.0	32.2	-----	-----	-----	-----	-----	-----
Chlorine	183	9.9	6.6	38.8	24.0	0.6	6.1	11.5	-----	8.8
Asbestos	159	0.6	6.3	11.4	-----	0.6	-----	28.3	-----	-----
Manganese	142	-----	-----	4.2	3.5	-----	-----	20.4	-----	1.4
Anilines	123	-----	6.5	24.5	9.0	-----	-----	11.5	-----	9.1
Cadmium	114	-----	1.8	13.2	-----	3.5	-----	7.9	-----	-----
Radioactive material	90	-----	-----	2.2	-----	-----	-----	-----	-----	2.2
Mercury	67	2.8	2.8	1.5	-----	10.4	-----	14.9	-----	-----
Antimony	67	13.4	13.4	14.9	4.5	-----	-----	-----	-----	-----
Arsenic	44	-----	-----	15.9	-----	2.3	-----	54.5	-----	52.4
Nitrogen oxides	41	-----	4.9	4.9	7.3	-----	2.4	-----	-----	-----
Cyanide	24	-----	-----	33.3	-----	-----	-----	25.0	-----	-----
Phosphorus	14	-----	-----	28.6	50.0	-----	-----	28.6	-----	28.6

TABLE 26—MAJOR EXPOSURES OF THE CHIEF OCCUPATIONS IN THE CHARCOAL COKE INDUSTRY

Number of Workers in Survey.....	403
Number of Workers Exposed.....	332
Percent of Workers Exposed.....	83.0%
Number of Exposures per Person Exposed.....	3.3

Occupation	Organic dust	Bituminous coal dust	Other gases	Carbon monoxide	Coal tar products	Other organic solvents	Silicate dust	Oils	Silica dust	Other metals	Dermatitis producers
Number of workers exposed.....	221	208	196	129	97	94	38	29	18	15	13
Percent of workers exposed.....	54.9	51.6	48.7	32.0	24.0	23.2	9.4	7.2	4.5	3.7	3.2
Leuter men.....	•	•	•	•							
Pusher men.....	•	•	•	•							
Oven operators.....	•	•	•	•							
D- or cleaners.....	•	•	•	•							
Quench car men.....	•	•	•	•			•				
Lid men.....	•	•	•	•							
Larry men.....	•	•	•	•							
Heaters and helpers.....	•	•	•	•							
Cleaners.....	•	•	•	•			•				
Gas box operators.....	•	•	•	•							
Masons.....	•	•	•	•	•		•		•		
Cement gun operators.....	•	•	•	•			•		•		
Laborers.....	•	•	•	•			•		•		
Oilers.....	•	•	•	•				•			•
Rin men.....	•	•	•	•							
Coke loaders.....	•	•	•	•							
Conveyor men.....	•	•	•	•							
By-products operators.....	•	•	•	•	•	•					
Pipe fitters.....	•	•	•	•	•	•					
Boiler makers.....	•	•	•	•	•	•				•	
Repair gang.....	•	•	•	•	•	•					•
Machinists.....	•	•	•	•	•	•		•			

TABLE 27—PERCENT OF WORKERS EXPOSED TO SPECIFIED MATERIALS HAVING INDICATED TYPE OF HAZARD CONTROL—CHARCOAL AND COKE INDUSTRY

[illegible]

TABLE 28—MAJOR EXPOSURES OF THE CHIEF OCCUPATIONS IN THE EXPLOSIVES, FIREWORKS AND MATCH INDUSTRY

Number of Workers in Survey.....	879
Number of Workers Exposed.....	588
Percent of Workers Exposed.....	66.9%
Number of Exposures per Person Exposed.....	1.5

OCCUPATION	Dermatitis productors	Organic dust	Alcohols, esters and ethers	Petroleum	Other metals	Halogenated hydro- carbons	Mineral acids	Alkalies	Sulphur	Mercury	Antimony	Coal tar products	Carbon monoxide	Other gases	Lead	Phosphorus	Non-siliceous dust
Number of workers exposed.....	291	81	73	67	37	27	26	23	23	21	21	20	15	15	15	10	10
Percent of workers exposed.....	33.2	9.2	8.3	7.6	4.2	3.0	3.0	2.6	2.6	2.4	2.4	2.3	1.7	1.7	1.7	1.1	1.1
Washers.....							•	•					•	•			
Laborers.....	•				•						•	•			•		
Grinders and mixers.....	•		•	•	•				•		•				•	•	•
Punch press operators.....	•											•					
Lathe hands and tool makers.....	•																
Priming machine operators.....										•							
Assemblers.....	•					•				•							
Finishers.....					•						•						
Loaders and fillers.....	•		•			•					•					•	
Inspectors.....			•														
Feeder operators.....					•				•		•				•	•	
Heat treaters.....													•	•			
Setters.....						•				•							

TABLE 29—PERCENT OF WORKERS EXPOSED TO SPECIFIED MATERIALS HAVING INDICATED TYPE OF HAZARD CONTROL—EXPLOSIVES, FIREWORKS, MATCHES INDUSTRY

[illegible]

TABLE 30—MAJOR EXPOSURES OF THE CHIEF OCCUPATIONS IN THE FERTILIZER INDUSTRY

Number of Workers in Survey.....250
 Number of Workers Exposed.....249
 Percent of Workers Exposed.....99.5%
 Number of Exposures per Person Exposed.....3.2

Occupation	Salts	Non-siliceous dust	Amines	Alkalies	Organic dust	Other gases	Mineral acids	Fluorides	Sulphur dioxide
Number of workers exposed.....	221	184	110	104	75	71	10	5	4
Percent of workers exposed.....	88.4	73.6	44.1	41.6	30.0	28.4	4.0	2.0	1.6
Laborers.....	•	•	•	•	•	•	•	•	•
Mixers.....	•	•	•	•	•	•	•	•	•
Loaders and unloaders.....	•	•	•	•	•	•	•	•	•
Weigh men.....	•	•	•	•	•	•	•	•	•
Repair men.....	•	•	•	•	•	•	•	•	•
Truckers.....	•	•	•	•	•	•	•	•	•
Millers.....	•	•	•	•	•	•	•	•	•
Fillers (bag men).....	•	•	•	•	•	•	•	•	•
Bag sewers.....	•	•	•	•	•	•	•	•	•
Acid men.....	•	•	•	•	•	•	•	•	•

TABLE 31—PERCENT OF WORKERS EXPOSED TO SPECIFIED MATERIALS HAVING INDICATED TYPE OF HAZARD CONTROL—FERTILIZER INDUSTRY

Materials	Number of exposures	Percent of exposed workers having specified control								
		Positive ventilation	Negative ventilation	Local exhaust	Isolation	Wet method	Gas masks	Respirators	Pressure helmets	Other
All specified materials.....	805	-----	0.4	2.0	0.5	0.2	-----	11.3	-----	-----
Salt.....	221	-----	0.5	0.5	0.5	-----	-----	13.1	-----	-----
Non-siliceous dust.....	184	-----	-----	2.2	0.5	1.1	-----	-----	-----	-----
Amines.....	110	-----	-----	-----	-----	-----	-----	29.0	-----	-----
Alkalies.....	104	-----	-----	-----	-----	-----	-----	-----	-----	-----
Organic dust.....	75	-----	-----	-----	-----	-----	-----	28.0	-----	-----
Other gases.....	71	-----	-----	1.4	-----	-----	-----	16.9	-----	-----
Acids, mineral.....	10	-----	10.0	40.0	10.0	-----	-----	-----	-----	-----
Ink.....	6	-----	-----	-----	-----	-----	-----	-----	-----	-----
Fluorides.....	5	-----	-----	60.0	20.0	-----	-----	-----	-----	-----
Sulphur dioxide.....	4	-----	-----	50.0	-----	-----	-----	-----	-----	-----
Petroleum.....	4	-----	-----	-----	-----	-----	-----	-----	-----	-----
Chemicals.....	3	-----	33.4	-----	-----	-----	-----	-----	-----	-----
Other metals.....	3	-----	-----	-----	-----	-----	-----	-----	-----	-----
Dermatitis.....	2	-----	-----	-----	-----	-----	-----	-----	-----	-----
Alcohols, esters and ether.....	2	-----	-----	-----	-----	-----	-----	-----	-----	-----
Carbon monoxide.....	1	-----	-----	100.0	-----	-----	-----	-----	-----	-----

TABLE 34—MAJOR EXPOSURES OF THE CHIEF OCCUPATIONS IN THE PETROLEUM REFINERING INDUSTRY

Number of Workers in Survey.....	1891
Number of Workers Exposed.....	1266
Percent of Workers Exposed.....	91.0%
Number of Exposures per Person Exposed.....	3.8

[illegible]

TABLE 35—PERCENT OF WORKERS EXPOSED TO SPECIFIED MATERIALS HAVING INDICATED TYPE OF HAZARD CONTROL—PETROLEUM REFINING INDUSTRY

[illegible]

TABLE 38—MAJOR EXPOSURES OF THE CHIEF OCCUPATIONS IN THE SOAP INDUSTRY

Number of Workers in Survey.....	895
Number of Workers Exposed.....	583
Percent of Workers Exposed.....	65.1%
Number of Exposures per Person Exposed.....	1.8

Occupation	Alkalies	Silica dust	Oil	Dermatitis producers	Organic dust	Silicate dust	Other salts
Number of workers exposed.....	482	79	78	69	52	51	46
Percent of workers exposed.....	54.0	8.8	8.7	7.7	5.8	5.7	5.1
Grinders.....	●●				●		
Cutters and molders.....	●●●●●●●●●●						
Helpers.....	●●●●●●●●●●						
Chemists.....	●●●●●●●●●●						
Fillers.....	●●●●●●●●●●						
Foremen.....	●●●●●●●●●●	●●	●			●	●
Laborers.....	●●●●●●●●●●	●●	●	●	●	●	●
Packers.....	●●●●●●●●●●						
Mixers.....	●●●●●●●●●●	●	●			●	●
Chip driers.....	●●●●●●●●●●						
Framemen.....	●●●●●●●●●●						
Kettlemen (cookers).....	●●●●●●●●●●						●●●
Wrappers and packers.....	●●●●●●●●●●						
Soap makers.....	●●●●●●●●●●	●●	●			●	●●
Machinists and helpers.....	●●●●●●●●●●			●			

TABLE 39—PERCENT OF WORKERS EXPOSED TO SPECIFIED MATERIALS HAVING INDICATED TYPE OF HAZARD CONTROL—SOAP INDUSTRY

[illegible]

TABLE 40—MAJOR EXPOSURES OF THE CHIEF OCCUPATIONS IN THE STARCH AND BAKING POWDER INDUSTRY

Number of Workers in Survey.....	3066
Number of Workers Exposed.....	2571
Percent of Workers Exposed.....	84.0%
Number of Exposures per Person Exposed.....	1.6

Occupation	Organic dust	Sulphur dioxide	Dermatitis producers	Oil	Mineral acids	Alkalies	Petroleum	Lead	Bituminous coal dust	Chemicals
Number of workers exposed.....	1525	413	346	290	279	119	118	114	114	109
Percent of workers exposed.....	49.7	13.4	11.3	9.4	9.1	3.9	3.8	3.7	3.7	3.5
Chemists.....				•	••	•				•
Steepers.....		•			••	•				
Feed and line press men.....	•	•			••	•				
Converters and mixers.....	•			•	••	•				
Blenders and helpers.....	•		•		••	•	•			
Cooker operators.....	•			•	••	•				
Tinners.....	•	•			•			•		
Firemen and boiler men.....									••	
Kiln men.....	•		•						••	
Coal dock men.....	•								••	
Drier men.....	•								•	
Labelers.....	•									
Handy girls.....	•									
Shovelers.....	•									
Feed loaders and unloaders.....	•		•							
Sweepers.....	•	•	•	•						
Foremen.....	•	•	•	•						
Packers.....	•		•							
Filter men.....	•									
Grinders.....	•									
Reel men.....	•									
Bag cleaners.....	•	•	•							
Mill and separator operators.....	•	•	•							
Maintenance men.....	•		•	•			•	•		
Yard gang men.....	•									
Truckers.....	•									
Machine tenders.....	•		•		•			•		
Cleaners.....	•		•	•						
Pump men.....	•	•	•							
Table tenders.....	•	•	•							
Sulphur men.....	•	•	•							
Shakers.....	•	•	•							
Oil expellers.....	•		•	•						
Oilers.....	•						•			

TABLE 41—PERCENT OF WORKERS EXPOSED TO SPECIFIED MATERIALS HAVING INDICATED TYPE OF HAZARD CONTROL—STARCH AND BAKING POWDER INDUSTRY

Materials	Number of exposures	Percent of exposed workers having specified control								
		Positive ventilation	Negative ventilation	Local exhaust	Isolation	Wet method	Gas masks	Respirators	Pressure helmets	Other
All specified materials.....	4,180	0.4	7.2	24.3	2.6	1.5	-----	0.7	0.9	0.1
Organic dust.....	1,525		0.2	32.7	0.2	0.2	-----	0.3		
Sulphur dioxide.....	413	3.6	57.7	23.5			-----	2.2		
Dermatitis.....	346						-----			
Oil.....	290				3.8		-----			
Acids, mineral.....	279		5.4	59.1	26.1		-----			
Alkalies.....	119			58.7	2.5		-----			3.4
Petroleum.....	118		3.4				-----			
Coal dust, bituminous.....	114				5.7	37.7	-----			
Lead.....	114			24.6			-----	1.8		
Chemicals.....	109						-----			
Other salts.....	95			18.9			-----			
Silicate dust.....	75			4.0		16.0	-----			
Other metals.....	74			9.5			-----	8.1	24.3	
Paint.....	71						-----	2.7		
Organic solvents.....	69						-----			
Acids, organic.....	62			100.0			-----			
Silica dust.....	62		21.0	32.3		4.8	-----	9.7	29.0	
Alcohols, esters and ether.....	49		6.1	2.1			-----			
Lacquer.....	45		4.4				-----			
Other gases.....	27			33.3			-----			
Hydrogen sulphide.....	24		100.0				-----			
Coal tar products.....	20						-----	10.0		
Chlorine.....	19			100.0			-----			
Ink.....	18						-----			
Non-siliceous dust.....	15			26.6			-----			
Asbestos.....	8			37.5			-----			
Aldehydes.....	5			60.0			-----			
Cyanide.....	4			100.0			-----			
Fluorides.....	3			100.0			-----			
Dye.....	3			100.0			-----			
Carbon monoxide.....	2						-----			
Antimony.....	2						-----			
Chromium.....	1						-----			

TABLE 42—MAJOR EXPOSURES OF THE CHIEF OCCUPATIONS IN THE CARBON PAPER, INKED RIBBONS AND INK INDUSTRY

Number of Workers in Survey.....673
 Number of Workers Exposed.....528
 Percent of Workers Exposed.....78.5%
 Number of Exposures per Person Exposed.....3.4

Occupation	Other organic solvents	Ink	Dyes	Lead	Chromium	Oil	Organic dust	Lacquers	Other metals	Petroleum
Number of workers exposed.....	301	284	183	143	119	119	100	79	78	71
Percent of workers exposed.....	44.8	42.3	27.2	21.3	17.7	17.7	15.0	11.7	11.6	10.5
Mixers.....	●	●	●	●	●	●	●	●	●	●
Varnish maker.....	●	●	●	●	●	●	●	●	●	●
Chemists.....	●	●	●	●	●	●	●	●	●	●
Color matchers.....	●	●	●	●	●	●	●	●	●	●
Grinders.....	●	●	●	●	●	●	●	●	●	●
Batch weighers.....	●	●	●	●	●	●	●	●	●	●
Loaders.....	●	●	●	●	●	●	●	●	●	●
Coaters.....	●	●	●	●	●	●	●	●	●	●
Spoolers and rewinders.....	●	●	●	●	●	●	●	●	●	●
Bottle fillers.....	●	●	●	●	●	●	●	●	●	●
Ribbon maker.....	●	●	●	●	●	●	●	●	●	●
Roller men.....	●	●	●	●	●	●	●	●	●	●
Drum washers.....	●	●	●	●	●	●	●	●	●	●
Converters.....	●	●	●	●	●	●	●	●	●	●

TABLE 43—PERCENT OF WORKERS EXPOSED TO SPECIFIED MATERIALS HAVING INDICATED TYPE OF HAZARD CONTROL—CARBON PAPER, INKED RIBBONS AND INK INDUSTRY

Materials	Number of exposures	Percent of exposed workers having specified control								
		Positive ventilation	Negative ventilation	Local exhaust	Isolation	Wet method	Gas masks	Respirators	Pressure helmets	Other
All specified materials.....	1,790		10.7	3.2		0.4		3.9		5.3
Organic solvents.....	301		8.6	1.9						6.3
Ink.....	284		9.2			0.4				7.4
Dye.....	183		18.0	1.1		0.5		1.6		1.1
Lead.....	143		3.5			0.7		11.2		
Oil.....	119		10.1	6.7						
Chromium.....	119		4.2			0.8		13.5		
Organic dust.....	100		15.0	1.0				13.0		6.0
Lacquer.....	79		13.9	8.9						
Other metals.....	78		6.4	1.3		1.3		6.4		
Petroleum.....	71			8.5						4.2
Halogenated hydrocarbons.....	42		45.2							
Alkalies.....	41									24.4
Non-siliceous dust.....	31					3.2		6.4		
Sulphur.....	29		17.2			3.4		6.8		
Silicate dust.....	20		30.0							
Alcohols, esters and ether.....	19		42.0	31.5						5.3
Acids, organic.....	17		23.5							
Chemicals.....	17									
Coal tar products.....	17		23.5					5.9		
Aldehydes.....	16			100.0						
Anilines.....	10							10.0		
Coal dust, bituminous.....	8									
Manganese.....	8							12.5		
Acids, mineral.....	6		66.5							
Cyanide.....	5									
Silica dust.....	5							100.0		
Other salts.....	5							20.0		
Carbon monoxide.....	4			50.0						
Other gases.....	4			50.0						
Radioactive material.....	4									
Cadmium.....	2		100.0					100.0		
Mercury.....	2		100.0					100.0		
Paint.....	1					100.0				

TABLE 44—MAJOR EXPOSURES OF THE CHIEF OCCUPATIONS IN THE
CHEMICALS AND DYES INDUSTRY

Number of Workers in Survey.....2758
 Number of Workers Exposed.....2100
 Percent of Workers Exposed.....76.3%
 Number of Exposures per Person Exposed..... 2.3

Occupation	Other metals	Alkalies	Mineral acids	Other Salts	Fluorides	Other gases	Sulphur dioxide	Non-siliceous dust	Coal tar products	Other organic solvents	Lead	Bituminous coal dust	Organic dust
Number of workers exposed.....	821	700	483	266	185	178	166	165	141	133	121	116	105
Percent of workers exposed.....	29.8	25.4	18.2	9.7	6.7	6.5	6.0	6.0	5.1	4.8	4.3	4.2	3.8
Laborers.....	•	•	•	•	•				•		•	•	
Painters.....	•	•			•						•		
Filter operators.....	•									•	•		
Feeders.....	•					•							
Foremen.....	•	•		•	•		•	•	•				•
Loaders and unloaders.....	•	•			•			•				•	•
Electricians.....	•	•			•		•	•	•		•		
Welders.....	•	•				•			•				
Mixers.....	•	•	•										
Crusher men.....	•	•						•				•	•
Washers.....	•	•								•			•
Concentrator operators.....		•	•				•						•
Sulfur operators.....			•				•						
Chemists.....		•	•				•		•	•	•		
Acid stillmen and helpers.....			•		•		•						
Chamber men.....			•		•		•				•		
Lead burners and helpers.....			•		•	•	•				•		
Pipe fitters.....		•	•				•				•		
Caustic tank operators and helpers.....		•	•				•				•		
Precipitate men.....		•	•				•						
Pump men.....		•							•				
Utility men.....		•	•			•	•		•				
Naphthalene men.....									•				
Weighers and packers.....				•	•			•	•				
Firemen.....												•	
Kiln operators.....							•					•	
Grinders.....		•						•					•
Millers.....							•	•					•
Pot men.....		•	•		•				•				
Furnace men.....				•		•							
Sulphate makers.....				•				•		•			
Control men.....	•	•		•				•		•			•

TABLE 46—MAJOR EXPOSURES OF THE CHIEF OCCUPATIONS IN THE
CLEANING, POLISHING, ETC., INDUSTRY

Number of Workers in Survey.....337
 Number of Workers Exposed.....201
 Percent of Workers Exposed.....59.7%
 Number of Exposures per Person Exposed.....4.2

Occupation	Alkalies	Petroleum	Other organic solvents	Other Gases	Organic dust	Alcohols, esters and ethers	Dyes	Amines
Number of workers exposed.....	103	103	94	78	75	72	68	56
Percent of workers exposed.....	30.6	30.6	27.8	23.2	22.2	21.4	20.2	16.6
Mixers.....	•	•	•	•	•	•	•	•
Chemists.....	•	•	•	•	•	•	•	•
Laborers.....	•	•	•	•	•	•	•	•
Packers.....	•	•	•	•	•	•	•	•
General helpers.....	•	•	•	•	•	•	•	•
Filling machine operators.....	•	•	•	•	•	•	•	•

TABLE 47—PERCENT OF WORKERS EXPOSED TO SPECIFIED MATERIALS HAVING INDICATED
TYPE OF HAZARD CONTROL—CLEANING AND POLISHING, ETC. INDUSTRY

Materials	Number of exposures	Percent of exposed workers having specified control								
		Positive ventilation	Negative ventilation	Local exhaust	Isolation	Wet method	Gas masks	Respirators	Pressure helmets	Other
All specified materials.....	849		58.2	5.2	2.2	0.7	1.4	5.5		3.5
Alkalies.....	103		66.9	6.8	1.9			16.5		
Petroleum.....	103		53.4	3.9				1.0		27.2
Organic solvents.....	94		60.6							
Other gases.....	78		70.6							
Organic dust.....	75		22.7	5.3	5.3			17.4		
Alcohols, esters and ether.....	72		76.5							
Dye.....	68		81.0							
Amines.....	56		99.0							
Oil.....	46		26.1					2.2		
Silica dust.....	16			68.9	37.6					
Other metals.....	16				18.8			18.8		
Acids, mineral.....	14									
Chlorine.....	13		92.4				84.5	84.5		
Halogenated hydrocarbons.....	13									
Silicate dust.....	12			41.6						
Non-siliceous dust.....	12			91.6	50.0			8.3		
Dermatitis.....	10									
Lacquer.....	8									
Chemicals.....	7									
Anilines.....	7									
Other salts.....	6					50.0				
Acids, organic.....	5									
Coal tar products.....	5									
Aldehydes.....	4									
Coal dust, bituminous.....	4									
Paint.....	2		100.0							100.0
Carbon monoxide.....	1			100.0						

TABLE 48—MAJOR EXPOSURES OF THE CHIEF OCCUPATIONS IN THE DRUG AND PATENT MEDICINE INDUSTRY

Occupation	Medicinal compounds	Organic dust	Alcohols, esters and ethers	Lacquers	Other organic solvents	Mineral acids	Alkalies
Number of workers exposed.....	617	266	207	176	125	118	113
Percent of workers exposed.....	53.2	22.9	17.8	15.2	10.8	10.2	9.8
Chemist.....	•••		•		•	•••	•
Bottlers.....	•••	•			•	•••	•
Mixers.....	•••	•			•	•••	•
Ampoule washers.....	•••				•	•••	•
Chemical workers.....	•••		•		•	•••	•
Compounders.....	•••	•••			•	•••	•
Packers.....	•••	•••		•	•	•••	•
Fillers.....	•••	•••	•••		••	•••	••
Laborers.....	•••	•••	•••		•	•••	•
Grinders.....	•••	•••	•••		•	•••	•
Tablet makers.....	•••	•••	•••		•	•••	•
Pharmacists (drug preparer).....	•••	•••	•••	•	•	•	
Capsule formers.....	•••	•••	•••	•	•	•	
Extractors.....	•	•	•••	•	•	•	
Defatters.....	•	•	•		•	•	
Foremen and foreladies.....	•	•	•		•	•	
Maintenance men.....	•	•	•		•	•	

TABLE 49—PERCENT OF WORKERS EXPOSED TO SPECIFIED MATERIALS HAVING INDICATED TYPE OF HAZARD CONTROL—DRUGS AND PATENT MEDICINES INDUSTRY

[illegible]

TABLE 52—MAJOR EXPOSURES OF THE CHIEF OCCUPATIONS IN THE GREASE AND TALLOW INDUSTRY

Number of Workers in Survey.....	257
Number of Workers Exposed.....	221
Percent of Workers Exposed	86.0%
Number of Exposures per Person Exposed.....	1.9

Occupation	Infections	Petroleum	Organic dust	Oil	Silicate dust	Bituminous coal dust	Hydrogen sulphide	Other salts
Number of workers exposed.....	115	45	45	40	34	25	22	22
Percent of workers exposed.....	44.8	17.5	17.5	15.6	13.2	9.7	8.6	8.6
Firemen (boiler men).....								
Laborers.....	•	•	•	•	•	•	•	•
Compounders.....	•	•	•	•	•			
Wax makers.....		•	•	•	•			
Mixers.....	•	•	•	•				
Crushers.....	•	•	•					
Sackers.....			•					
Skinner's.....	•						•	
Cookers.....	•	•		•			•	•
Butchers.....	•	•					•	•
Maintenance men.....	•	•	•				•	
Trimmers.....	•						•	
Tank men.....	•			•				•
Press men.....	•			•				
Dippers.....		•		•				
Wipers.....		•		•				

TABLE 53—PERCENT OF WORKERS EXPOSED TO SPECIFIED MATERIALS HAVING INDICATED TYPE OF HAZARD CONTROL—GREASE AND TALLOW INDUSTRY

[illegible]

TABLE 54—MAJOR EXPOSURES OF THE CHIEF OCCUPATIONS NON-PETROLEUM OILS INDUSTRY

Number of Workers in Survey.....286
 Number of Workers Exposed.....258
 Percent of Workers Exposed.....90.4%
 Number of Exposures per Person Exposed.....1.9

Occupation	Oil	Organic dust	Alkalies	Petroleum	Silicate dust	Other organic solvents
Number of workers exposed.....	147	118	35	30	22	20
Percent of workers exposed.....	51.4	41.3	12.2	10.5	7.7	7.0
Cleaner.....	•		•	•		•
Refinery tender.....	•		•		•	
Compounder.....	•		•	•		
Laborer.....	•	•	•	•		
Chemist.....	•		•			•
Firemen.....					•	
Expeller.....	•	•			•	
Foremen.....		•				
Seed Handler.....		•				
Sewer.....		•				
Packers.....		•				
Extractor.....	•	•				•
Maintenance men.....	•	•		•		•
Car unloader.....		•				
Silo operator.....		•				
Bean preparer.....		•				
Fillers.....	•					
Press tender.....	•					
Truckers.....	•	•				

TABLE 55—PERCENT OF WORKERS EXPOSED TO SPECIFIED MATERIALS HAVING INDICATED TYPE OF HAZARD CONTROL—NON-PETROLEUM OILS INDUSTRY

Materials	Number of exposures	Percent of exposed workers having specified control								
		Positive ventilation	Negative ventilation	Local exhaust	Isolation	Wet method	Gas masks	Respirators	Pressure helmets	Other
All specified materials.....	482		3.3	21.4	11.9			1.2		5.8
Oil.....	147		5.5		15.7					5.5
Organic dust.....	118		6.8	39.0				4.2		
Alkalies.....	35			34.3	31.4					5.7
Petroleum.....	30									26.7
Silicate dust.....	22				36.4					
Organic solvents.....	20			50.0	45.0					
Acids, mineral.....	17			70.5						
Coal dust, bituminous.....	16									
Chemicals.....	15									
Acids, organic.....	12			100.0						
Coal tar products.....	8									100.0
Non-siliceous dust.....	7									
Other gases.....	7			57.0						
Alcohol, esters and ether.....	7				85.6					
Dermatitis.....	6									
Carbon monoxide.....	6			100.0						
Other metals.....	3									
Fluorides.....	2									100.0
Silica dust.....	1									
Infection.....	1									
Lacquer.....	1									
Paint.....	1			100.0				100.0		

TABLE 56—MAJOR EXPOSURES OF THE CHIEF OCCUPATIONS IN THE PERFUME AND COSMETIC INDUSTRY

Number of Workers in Survey.....966
 Number of Workers Exposed.....512
 Percent of Workers Exposed.....53.0%
 Number of Exposures per Person Exposed.....2.7

Occupation	Alcohols, esters and ethers	Oil	Alkalies	Silicate dust	Organic dust	Petroleum	Dyes	Other metals
Number of workers exposed.....	253	151	134	125	121	103	88	83
Percent of workers exposed.....	26.2	15.6	13.9	12.9	12.5	10.7	9.1	8.6
Chemist.....	•	•	•	•	•	•	•	•
Foremen.....	•	•	•	•	•	•	•	•
Mixers (mill operators).....	•	•	•	•	•	•	•	•
Glycerin recoverers.....	•	•	•	•	•	•	•	•
Soap makers.....	•	•	•	•	•	•	•	•
Pressers.....	•	•	•	•	•	•	•	•
Powder maker.....	•	•	•	•	•	•	•	•
Packers (fillers).....	•	•	•	•	•	•	•	•
Janitor.....	•	•	•	•	•	•	•	•
Pad makers.....	•	•	•	•	•	•	•	•
Bottlers.....	•	•	•	•	•	•	•	•

TABLE 57—PERCENT OF WORKERS EXPOSED TO SPECIFIED MATERIALS HAVING INDICATED TYPE OF HAZARD CONTROL—PERFUME AND COSMETIC INDUSTRY

Materials	Number of ex- posures	Percent of exposed workers having specified control								
		Positive ven- tilation	Negative ven- tilation	Local exhaust	Isola- tion	Wet method	Gas masks	Respi- rators	Pressure helmets	Other
All specified materials...	1,362	4.9	5.3	14.1	6.2	1.0	-----	10.9	-----	3.2
Alcohols, esters and ether	253	13.8	15.8	1.9	0.8	-----	1.6	-----	-----	3.9
Oil.....	151	1.3	-----	-----	21.2	-----	-----	-----	-----	-----
Alkalies.....	134	3.0	1.5	33.6	10.5	-----	-----	28.4	-----	-----
Silicate dust.....	125	-----	3.2	39.2	2.4	0.8	-----	35.2	-----	-----
Organic dust.....	121	0.8	0.8	45.5	2.5	-----	-----	31.4	-----	-----
Petroleum.....	103	3.9	6.8	-----	24.3	-----	-----	-----	-----	-----
Dye.....	88	-----	6.8	2.3	2.3	4.6	-----	4.6	-----	-----
Other metals.....	83	-----	4.8	13.3	2.4	-----	-----	7.2	-----	-----
Non-siliceous dust.....	39	10.0	-----	25.6	-----	-----	-----	-----	-----	5.0
Acids, organic.....	38	-----	-----	-----	-----	-----	-----	10.5	-----	10.5
Coal tar products.....	29	-----	-----	3.4	-----	-----	-----	-----	-----	-----
Lacquer.....	29	-----	-----	-----	-----	-----	-----	-----	-----	-----
Fluorides.....	22	-----	-----	-----	-----	-----	-----	-----	-----	-----
Dermatitis.....	20	-----	-----	-----	-----	-----	-----	-----	-----	-----
Chemicals.....	17	11.8	11.8	-----	-----	-----	-----	-----	-----	-----
Mercury.....	14	14.3	-----	-----	-----	28.6	-----	14.3	-----	-----
Acids, mineral.....	13	15.4	15.4	-----	-----	-----	-----	30.8	-----	30.8
Cadmium.....	11	-----	-----	-----	-----	36.4	-----	18.2	-----	-----
Organic solvents.....	11	-----	-----	9.1	-----	-----	-----	-----	-----	-----
Amines.....	10	-----	-----	-----	-----	-----	-----	-----	-----	-----
Paint.....	9	44.5	44.5	-----	-----	-----	-----	-----	-----	-----
Silica dust.....	8	-----	-----	-----	-----	-----	-----	-----	-----	-----
Other gases.....	8	50.0	-----	75.0	-----	-----	-----	25.0	-----	25.0
Lead.....	6	-----	-----	50.0	-----	-----	-----	-----	-----	-----
Ink.....	6	-----	-----	-----	-----	-----	-----	-----	-----	-----
Carbon monoxide.....	4	100.0	-----	100.0	-----	-----	-----	-----	-----	-----
Other salts.....	4	-----	-----	-----	-----	-----	-----	-----	-----	-----
Asbestos.....	3	-----	-----	-----	-----	-----	-----	-----	-----	-----
Coal dust, bituminous.....	1	-----	-----	-----	-----	-----	-----	-----	-----	-----
Antimony.....	1	-----	-----	-----	-----	-----	-----	-----	-----	-----
Sulphur.....	1	-----	-----	-----	100.0	-----	-----	-----	-----	-----

CIGARS AND TOBACCO INDUSTRY

Cigars and Tobacco Industry

The cigars and tobacco industry was represented by 500 workers in five plants. This industry is one of the minor industries of Illinois. Most of the exposures were due to one plant employing 416 workers and engaged in the manufacture of snuff and chewing tobacco.

Exposures to Specified Materials: Of the 500 workers surveyed, 58.6 per cent were exposed, and each exposed worker averaged 1.4 exposures to specified materials. The major exposures of this industry are organic dust and dermatitis producers. Table 58 reveals the number and per cent of workers exposed to specified materials. It was found that 16 of the 49 specified materials, used for recording exposures, occurred in this industry. Table 59 reveals the major exposures of the chief occupations in this industry.

Control Measures: The extent to which control measures have been applied in this industry is revealed in Table 60. Local exhaust ventilation and isolation were found to be the most prevalent types of control measures that occurred in this industry.

TABLE 58—CIGARS AND TOBACCO INDUSTRY—EXPOSURE TO SPECIFIED MATERIALS

Materials	Number and percent of workers exposed	
	Cigars and tobacco	
Total number of workers.....	500	
Number of plants.....	5	
	No.	%
Acids, mineral.....	1	*
Alkalies.....	1	*
Coal dust, bituminous.....	1	*
Silicate dust.....	2	*
Non-siliceous dust.....	2	*
Organic, dust.....	197	39.4
Dye.....	1	*
Dermatitis.....	164	32.8
Carbon monoxide.....	1	*
Other gases.....	7	1.4
Lead.....	3	0.6
Other metals.....	3	0.6
Ink.....	5	1.0
Oil.....	5	1.0
Organic solvents.....	7	1.4
Petroleum.....	11	2.2

*—Denotes less than $\frac{1}{2}$ of 1%.

TABLE 59—MAJOR EXPOSURES OF THE CHIEF OCCUPATIONS IN THE CIGAR AND TOBACCO INDUSTRY

Number of Workers in Survey.....500
 Number of Workers Exposed.....293
 Percent of Workers Exposed.....58.6%
 Number of Exposures per Person Exposed.....1.4

Occupation	Organic dust	Dermatitis producers	Petroleum
Number of workers exposed.....	197	163	11
Percent of workers exposed.....	39.4	32.6	2.2
Laborers.....	●	●	
Foremen.....	●	●	
Strippers.....	●	●	
Cigar makers.....	●	●	
Packers.....	●	●	
Bunch maker.....	●	●	
Rollers.....	●	●	
Sorters.....	●	●	
Driers.....	●	●	
Grinders.....	●	●	
Mixers.....	●	●	
Finishers.....	●	●	
Machine wrappers.....	●	●	
Lump Breaker operators.....	●	●	
Spraying machine operators.....	●		●

TABLE 60—PERCENT OF WORKERS EXPOSED TO SPECIFIED MATERIALS HAVING INDICATED TYPE OF HAZARD CONTROL—CIGARS AND TOBACCO INDUSTRY

Materials	Number of exposures	Percent of exposed workers having specified control								
		Positive ventilation	Negative ventilation	Local exhaust	Isolation	Wet method	Gas masks	Respirators	Pressure helmets	Other
All specified materials.....	410			10.0	7.6	0.7	0.7			
Organic dusts.....	197			19.8	14.2					
Dermatitis.....	163									
Petroleum.....	11									
Other gases.....	7			14.3	42.8		42.8			
Organic solvents.....	7									
Ink.....	5									
Oil.....	5									
Lead.....	3									
Other metals.....	3									
Silicate dust.....	2									
Non-siliceous dust.....	2					50.0				
Acids, mineral.....	1					100.0				
Alkalies.....	1									
Coal dust, bituminous.....	1									
Dye.....	1									
Carbon monoxide.....	1			100.0						

CLAY, GLASS AND STONE INDUSTRIES

Clay, Glass and Stone Industries

The clay, glass and stone industries were represented by 11,305 workers in 155 plants. These workers were in the following classifications: brick, tile and terra-cotta; glass; lime, cement and artificial stone; marble and stone yards; potteries; asphalt and roofing materials; asbestos products; grinding wheels and sandpaper; and miscellaneous industries. The largest number of workers surveyed were in the glass and asbestos products industries. Of the 11,305 workers surveyed, 70.2 per cent were exposed, and each exposed worker averaged 2.2 exposures to specified materials. The major exposures were silicate dust, silica dust, non-siliceous dust and alkalis. It was found that 43 of the 49 specified materials, used for recording exposures, occurred in these industries. Table 61 reveals the number and per cent of workers exposed to specified materials. Table 62 reveals the number and per cent of total exposures to specified materials, or the distribution of each exposure. This table shows that the chief exposure to the above mentioned dusts and alkalis occurred in the glass industry. However, it cannot be inferred that the glass industry is the most hazardous of these industries. This is not the case because approximately twice as many workers were surveyed in this industry than in any of the others. Table 63 reveals the extent to which control measures have been applied in these industries. Local exhaust ventilation, negative ventilation and respirators were found to be the most prevalent types of control measures. These are recognized control measures for dust which is the predominate exposure in this industry. However, a wider application of these measures is possible.

Brick, Tile and Terra-cotta Industry: The brick, tile and terra-cotta industry was represented by 1,192 workers in 22 plants. Of these 1,192 workers, 85.5 per cent were exposed, and each exposed worker averaged 1.8 exposures to specified materials. The major exposures were silicate and silica dusts. It was found that 30 of the 49 specified materials, used for recording exposures, occurred in this industry. Table 64 reveals the major exposures of the chief occupations in this industry. Table 65 reveals the extent to which control measures have been applied. Local exhaust ventilation and respirators were found to be the most prevalent types of control measures in this industry.

Glass Industry: The glass industry was represented by 4,263 workers in 12 plants. Of the 4,263 workers, 57.4 per cent were exposed and each exposed worker averaged 2.4 exposures to specified materials. The major exposures were silicate dust, alkalis and silica dust. It was found that 34 of the 49 specified materials, used for recording exposures, occurred in this industry. Table 66 reveals the major exposures of the chief occupations in this industry. Table 67 reveals the extent to which control measures have been applied. Negative general ventilation, respirators and local exhaust ventilation were found to be the most prevalent types of control measures in this industry.

Lime, Cement and Artificial Stone Industry: The lime, cement and artificial stone industry was represented by 510 workers in 11 plants. Of these 510 workers, 78.5 per cent were exposed, and each exposed worker averaged 2.1 exposures to specified materials. The major exposures were silicate dust, alkalis and non-siliceous dust. It was found that 19 of the 49 specified materials, used to record exposures, occurred in this industry. Table 68 reveals the major exposures of the chief occupations in this industry. Table 69 reveals the extent to which con-

trol measures have been applied. Local exhaust ventilation and positive general ventilation were found to be the most prevalent types of control measures in this industry.

Marble and Stone Industry: The marble and stone industry was represented by 337 workers in 34 plants. Of these 337 workers, 84.3 per cent were exposed, and each exposed worker averaged 2.0 exposures to specified materials. The major exposures were non-siliceous, silica and silicate dusts. It was found that 16 of the 49 specified materials, used to record exposures, occurred in this industry. Table 70 reveals the major exposures of the chief occupations in this industry. Table 71 reveals the extent to which control measures have been applied. Wet methods, local exhaust ventilation and respirators were found to be the most prevalent types of control measures in this industry.

Pottery Industry: The pottery industry was represented by 714 workers in 16 plants. Of these 714 workers, 82.2 per cent were exposed, and each exposed worker averaged 2.5 exposures to specified materials. The major exposures were silicate, silica and non-siliceous dusts. It was found that 23 of the 49 specified materials, used to record exposures, occurred in this industry. Table 72 reveals the major exposures of the chief occupations in this industry. Table 73 reveals the extent to which control measures have been applied. Local exhaust ventilation was found to be the most prevalent type of control measure in this industry.

Asphalt and Roofing Material Industry: The asphalt and roofing material industry was represented by 1,643 workers in 25 plants. Of these 1,643 workers, 74.5 per cent were exposed, and each exposed worker averaged 2.2 exposures to specified materials. The major exposures were silicate dust, petroleum and coal tar products. It was found that 28 of the 49 specified materials, used to record exposures, occurred in this industry. Table 74 reveals the major exposures of the chief occupations in this industry. Table 75 reveals the extent to which control measures have been applied. Negative general ventilation, local exhaust ventilation, and respirators were found to be the most prevalent types of control measures in this industry.

Asbestos Products Industry: The asbestos products industry was represented by 2,215 workers in 17 plants. Of these 2,215 workers, 72.5 per cent were exposed, and each exposed worker averaged 2.0 exposures to specified materials. The major exposures were asbestos and silicate dusts. It was found that 28 of the 49 specified materials, used to record exposures, occurred in this industry. Table 76 reveals the major exposures of the chief occupations in this industry. Table 77 reveals the extent to which control measures have been applied. Local exhaust ventilation and respirators were found to be the most prevalent types of control measures in this industry.

Grinding Wheel, Sandpaper, etc., Industry: The grinding wheel, sandpaper and abrasives industry was represented by 139 workers in nine plants. Of these 139 workers, 73.5 per cent were exposed, and each exposed worker averaged 3.1 exposures to specified materials. The major exposures were non-siliceous and silicate dusts and "other metals." It was found that 21 of the 49 specified materials, used to record exposures, occurred in this industry. Table 78 reveals the major exposures of the chief occupations in this industry. Table 79 reveals the extent to which control measures have been applied. Local exhaust ventilation and respirators were found to be the most prevalent types of control measures in this industry.

TABLE 61—CLAY, GLASS AND STONE INDUSTRIES—EXPOSURES TO SPECIFIED MATERIALS

Materials	All clay, glass and stone industries in survey	Number and percent of workers exposed																Other	
		Brick, tile and terra cotta		Glass		Lime, cement and artificial stone		Marble and stone yard		Pottery		Ashpalt and roof material		Asbestos products		Grinding wheels, sandpaper, etc.			
		No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%		No.
Total number of workers.....	11,305	1,192		4,263		510		337		714		1,643		2,215		139		292	
Number of plants.....	105	22		12		11		34		16		25		17		9		9	
Acids, organic.....	56	13	1.1	2	*			37	11.0							4	2.8		
Acids, mineral.....	127	1		57	1.3	16	3.1			7	1.0	18	1.1	20	0.9	2	1.4	6	
Accelerators.....	2																		
Aldehydes.....	4																		
Alkalies.....	1,477	20	1.7	849	20.0	148	29.0	2	0.6	26	3.6	21	1.3	375	16.9	25	18.0	11	
Chemicals.....	60	1		2	*	16	3.1					18	1.1	17	0.8			6	
Coal tar products.....	412	3.6								22	3.1	358	21.8	6	*	26	18.7		
Cyanides.....	2																		
Asbestos.....	1,149	10.2																	
Gypsum.....	1,203	1.8																	
Coal dust, bituminous.....	1																		
Coal dust, anthracite.....	1																		
Silica dust.....	2,112	17.9		456	38.2	83	16.3	150	44.06	184	25.8	101	6.2	216	9.8	26	18.7	137	
Silicate dust.....	3,755	33.5		683	57.2	985	23.1	234	45.8	118	35.0	407	57.1	654	23.0	39	28.1	156	
Non-siliceous dust.....	1,571	13.9		104	8.7	518	12.1	145	28.4	196	58.2	152	21.3	125	7.6	57	41.0	72	
Organic dust.....	826	7.3		71	5.9	171	4.0	28	5.5	5	1.5	32	4.5	187	11.4	10	7.2	47	
Dye.....	14			7	0.6														
Dermatitis.....	198	1.8																	
Fluorides.....	13			7	0.6														
Carbon monoxide.....	613	5.4		406	9.5	26	5.1	6	1.8	45	6.3	38	2.3	7	*	17	12.2		
Sulphur dioxide.....	318	2.8		30	2.5	280	6.6												
Other gases.....	666	5.9		416	9.8	9	1.8	4	1.2	51	7.2	47	2.9	29	1.3	17	12.2	1	
Arsenic.....	224	2.0		224	5.3														
Chromium.....	128	1.1		11	0.9	3	0.9			43	6.0	62	3.8	9	*				
Cadmium.....	38	*																	
Mercury.....	1																		
Manganese.....	282	2.5		7	0.6	208	4.9			60	8.4			7	*				
Lead.....	334	3.0		36	3.0	58	1.4	6	1.2	9	2.7	80	11.2	70	4.3	66	3.0	9	
Radioactive material.....	3			3	*														
Antimony.....	11			7	0.6			1	*			3	*						
Selenium.....	189	1.7		189	4.4														
Other metals.....	603	5.3		57	4.8	197	4.6	11	2.2	29	8.6	86	12.0	83	5.0	100	4.5	5	
Nitrogen oxides.....	7					4													
Infection.....	164	1.5		1	*														
Alcohols, esters and ether.....	105	1.0		1	*	47	1.1	13	2.6			163	9.9	3	*				
Halogenated hydrocarbons.....	10	*																	
Ink.....	23			10	*														
Lacquer.....	53	0.5																	
Oil.....	108	1.0		9	0.8	18	*	13	2.6	3	0.9	21	2.9	7	*	16	11.5	5	
Organic solvents.....	234	2.1		13	1.1	69	1.6	13	2.6	4	1.2	34	4.8	24	1.5	33	1.5	10	
Petroleum.....	992	8.8		230	2.8	44	8.6	3	0.9	45	6.3	474	28.8	72	4.4	10	0.7	3.4	
Paint.....	106	0.9		36	0.9	2	*												
Other salts.....	102	0.9		5	0.5					13	1.8	2							
Sulphur.....	18			48	1.1					36	5.1								

*—Denotes less than 1/2 of 1%.

TABLE 62—CLAY, GLASS AND STONE INDUSTRIES—EXPOSURES TO SPECIFIED MATERIALS

Materials	All clay, glass and stone industries in survey	Number and percentage of total exposures to the specified materials															
		Brick, tile and terra cotta		Glass		Lime, cement and artificial stone		Marble and stone yard		Pottery		Asphalt and roofing materials		Asbestos products		Grinding wheels, sandpaper	
		No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Total number of workers.....	11,305	1,192		4,253		510		337		714		1,643		2,215		139	
Total number of exposures.....	17,344	1,853		5,918		827		573		1,436		2,701		3,210		319	
Acids, organic.....	56	13	23.2	2	3.6												
Acids, mineral.....	127	1	0.8	57	44.9	16	12.6	37	66.1	7	5.5	18	14.2	20	15.8	4	7.1
Accelerators.....	2													2	100.0	2	1.6
Aldehydes.....	4			1	25.0							1	25.0				
Alkalies.....	1,477	20	1.4	849	57.6	148	9.8	2	0.1	26	1.8	21	1.4	37.5	25.4	25	50.0
Chemicals.....	60	1	1.7	2	3.3	16	26.6					18	30.0	17	28.4	1.7	0.8
Coal tar products.....	412									22	5.3	358	86.8	6	1.6	26	6.3
Cyanides.....	2			1	50.0			1	50.0			1	50.0				
Asbestos.....	1,149	114	56.2	7	3.5	11	5.4	3	1.5	13	6.4	97	8.4	1,048	91.2	4	0.4
Coal dust, bituminous.....	203											34	16.7	12	5.9	1	0.5
Coal dust, anthracite.....	1																
Silica dust.....	2,112	456	21.2	759	35.6	83	4.9	150	7.0	184	8.7	101	4.8	216	10.2	26	1.2
Sulfate dust.....	3,785	683	18.1	234	6.2	118	3.1	407	10.7	654	17.3	509	13.4	39	1.0	156	6.4
Non-siliceous dust.....	1,571	104	6.7	519	33.0	145	9.2	196	12.5	152	9.9	125	7.6	202	13.0	57	3.5
Organic dust.....	1,826	71	8.6	171	20.7	28	3.4	5	0.7	32	3.9	187	22.6	275	33.4	10	1.2
Dye.....	14	7	50.0					2	14.3	5	35.7					47	5.7
Dermatitis.....	198	2	1.0	67	33.8	8	4.0	2	1.0	20	10.1	19	9.7	76	38.4	4	2.0
Fluorides.....	13	7	53.8	6	46.2												
Carbon monoxide.....	613	68	11.2	406	66.2	26	4.2	6	1.0	45	7.3	38	6.2	7	1.1	17	2.8
Sulphur dioxide.....	318	30	9.4	280	88.1												
Other gases.....	666	92	13.8	416	62.4	9	1.3	4	0.6	51	7.7	47	7.0	29	4.4	17	2.6
Arsenic.....	224			224	100.0												
Chromium.....	128	11	8.6	3	2.3					43	33.6	62	48.5	9	7.0		
Cadmium.....	38			38	100.0												
Mercury.....	1			1	100.0												
Manganese.....	282	7	2.3	208	73.7					60	21.3			7	2.5		
Lead.....	334	36	10.7	58	17.1	6	2.0	9	2.8	80	23.9	70	21.0	66	19.8	9	2.7
Radioactive material.....	3			3	100.0												
Antimony.....	11	7	63.5			1	9.0					3	27.5				
Selenium.....	189			189	100.0												
Other metals.....	603	57	9.4	197	32.7	11	1.8	29	4.8	56	14.3	83	13.8	100	16.6	35	5.8
Nitrogen oxides.....	7	1	14.3	4	57.1											2	2.6
Infection.....	164	1	0.6														
Alcohols, esters and ether.....	105	1	1.0	47	44.7	13	12.3			35	33.4	163	99.4	3	2.9		
Halogenated hydrocarbons.....	10													5	21.8		
Ink.....	23			10	43.4												
Lacquer.....	53	1	1.7	8	15.2	13	24.5	3	5.7	21	39.6	7	6.5	2	3.8	16	14.9
Oil.....	106	9	8.3	18	16.6					34	31.3	24	22.2	7	6.5		
Organic solvents.....	234	13	5.6	69	30.0	13	5.6	4	1.7	19	8.6	72	30.7	33	14.1	1	0.4
Petroleum.....	992	28	2.8	280	28.2	44	4.5	3	0.3	45	4.5	474	47.8	137	13.8	15	1.5
Paint.....	106	5	4.7	36	34.0	2	1.7			13	12.3	2	1.9	17	16.1	9	8.5
Other salts.....	102	6	5.9	48	47.0					36	35.3			11	10.8	1	1.0
Sulphur.....	18													16	88.9	2	11.1

TABLE 63—PERCENT OF WORKERS EXPOSED TO SPECIFIED MATERIALS HAVING INDICATED TYPE OF HAZARD CONTROL—CLAY, GLASS AND STONE INDUSTRIES

Materials	Number of exposures	Percent of exposed workers having specified control								
		Positive ventilation	Negative ventilation	Local exhaust	Isolation	Wet method	Gas masks	Respirators	Pressure helmets	Other
All specified materials	17,344	0.7	19.9	20.6	1.1	8.0		18.5		1.
Silicate dust	3,785	1.3	17.0	13.1	1.3	12.7		18.0		0.1
Silica dust	2,112		21.2	12.6	1.8	15.2		28.2		0.3
Non-siliceous dust	1,571	0.1	24.6	14.5	1.1	16.1		26.4		0.2
Alkalies	1,477	1.8	11.0	8.4	0.8	3.7		17.8		0.8
Asbestos	1,149		4.6	24.8	0.6	5.1		27.3		2.1
Petroleum	992		17.2	14.9	2.8			2.2		3.7
Organic dust	826		1.8	30.2	0.1	14.0		10.5		2.9
Other gases	666		45.0	78.0	0.9					
Carbon monoxide	613		48.8	83.7						
Other metals	603		11.5	24.9	0.3	13.6		16.1		5.0
Coal tar products	412		8.7	19.2	4.1			1.0		3.4
Lead	334		13.8	18.5	0.3	3.0		16.8		10.8
Sulphur dioxide	318		90.5	44.4						
Manganese	282		49.5	9.6		0.4		62.4		
Organic solvents	234	0.9	5.1	13.7	2.6			8.1		2.1
Arsenic	224		62.5	12.5				82.8		
Coal dust, bituminous	203	3.0	0.5	1.0	0.5	2.0				
Dermatitis	198									
Selenium	189		74.0	6.3				88.3		
Infection	164									
Chromium	128		30.5	12.5	0.8	3.1		26.6		
Acids, mineral	127	12.6	10.2	11.0						36.2
Oil	108		13.0	7.4				4.6		2.8
Paint	106			14.2				16.0		4.7
Alcohols, esters and ether	105		10.5	44.8				6.7		
Other salts	102		2.9	25.5				29.4		
Chemicals	60	26.7	21.6							
Acids, organic	56		3.6					17.9		
Lacquer	53		3.8	77.4				13.2		
Cadmium	38							15.8		
Ink	23			13.0						13.0
Sulphur	18			44.3				23.3		
Dye	14			42.8						
Fluorides	13			53.8						38.5
Antimony	11			54.5						
Halogenated hydrocarbons	10			20.0						
Nitrogen oxides	7			28.6						
Aldehydes	4			50.0						
Radioactive material	3			100.0						
Accelerators	2									
Cyanide	2			100.0						
Coal dust, anthracite	1									
Mercury	1									

TABLE 64—MAJOR EXPOSURES OF THE CHIEF OCCUPATIONS IN THE
BRICK, TILE AND TERRA COTTA INDUSTRY

Number of Workers in Survey.....	1192
Number of Workers Exposed.....	1019
Percent of Workers Exposed.....	85.5%
Number of Exposures per Person Exposed.....	1.8

Occupation	Silicate Dust	Silica Dust	Bituminous Coal dust	Non-siliceous dust	Other gases	Organic dust	Carbon monoxide
Number of workers exposed.....	683	456	114	104	92	71	68
Percent of workers exposed.....	57.2	38.2	9.6	8.7	7.7	5.9	5.7
Laborers (yard men).....	●	●	●	●		●	
Sprayers.....	●	●		●			
Temperers (driers).....	●	●	●	●			
Firemen and helpers.....	●	●		●	●	●	●
Grinders (crusher men).....	●	●		●			
Maintenance men.....	●	●	●	●	●		●
Glaze makers.....	●	●		●			
Burners and helpers.....	●	●	●			●	●
Hopper and belt men.....	●	●		●			
Machine men and helpers (pressers).....	●	●					
Pug mill operators (mixers).....	●	●		●			
Tile makers, (panel makers).....	●	●		●			
Unloaders.....	●	●					
Wheelers.....	●	●				●	
Molders.....	●	●					
Setters (loaders).....	●	●					●
Foremen.....	●	●					
Off bearers.....	●	●					

TABLE 65—PERCENT OF WORKERS EXPOSED TO SPECIFIED MATERIALS HAVING INDICATED TYPE OF HAZARD CONTROL—BRICK, TILE AND TERRA COTTA INDUSTRY

[illegible]

TABLE 66—MAJOR EXPOSURES OF THE CHIEF OCCUPATIONS IN THE GLASS INDUSTRY

Number of Workers in Survey	4263
Number of Workers Exposed	2443
Percent of Workers Exposed	57.4%
Number of Exposures per Person Exposed	2.4

[illegible]

TABLE 67—PERCENT OF WORKERS EXPOSED TO SPECIFIED MATERIALS HAVING INDICATED TYPE OF HAZARD CONTROL—GLASS INDUSTRY

[illegible]

TABLE 70—MAJOR EXPOSURE OF THE CHIEF OCCUPATIONS IN THE MARBLE AND STONE YARD INDUSTRY

Number of Workers in Survey.....	387
Number of Workers Exposed.....	284
Percent of Workers Exposed.....	84.3%
Number of Exposures per Person Exposed.....	2.0

Occupation	Non-siliceous dust	Silica dust	Silicate dust	Organic acids	Other metals
Number of workers exposed.....	196	150	118	37	29
Percent of workers exposed.....	58.2	44.6	35.0	11.0	8.6
Grinders.....	●	●	●		
(Bevelers) (groovers).....	●				
Edgers.....	●				
Polishers.....	●	●	●	●	●
Planer.....	●		●		
Driller.....	●	●	●		
Machinists.....	●	●	●		
Foremen and Superintendent.....	●	●	●		
Laborers.....	●	●	●		
Rubber.....	●	●	●		●
Cutters.....	●	●	●		
Sewers.....	●	●	●		
Sand blaster.....	●	●	●		
Assembler.....	●	●	●		

TABLE 71—PERCENT OF WORKERS EXPOSED TO SPECIFIED MATERIALS HAVING INDICATED TYPE OF HAZARD CONTROL—MARBLE AND STONE YARD INDUSTRY

[illegible]

TABLE 74—MAJOR EXPOSURES OF THE CHIEF OCCUPATIONS IN THE ASPHALT AND ROOFING MATERIAL INDUSTRY

Number of Workers in Survey.....1643
 Number of Workers Exposed.....1221
 Percent of Workers Exposed.....74.5%
 Number of Exposures per Person Exposed.....2.2

Occupation	Silicate dust	Petroleum	Coal tar products	Organic dust	Infections	Non-siliceous dust	Silica dust	Asbestos dust
Number of workers exposed.....	654	474	358	187	163	125	101	97
Percent of workers exposed.....	39.7	28.8	21.8	11.4	9.9	7.6	6.2	5.9
Laborers.....	•	•	•	•	•	•	•	•
Foremen and superintendents.....	•	•	•	•	•	•	•	•
Saturators.....	•	•	•	•	•	•	•	•
Slaters.....	•	•	•	•	•	•	•	•
Coaters.....	•	•	•	•	•	•	•	•
Tenders and watchers.....	•	•	•	•	•	•	•	•
Winders, wrappers, packers.....	•	•	•	•	•	•	•	•
Cutters.....	•	•	•	•	•	•	•	•
Machinists.....	•	•	•	•	•	•	•	•
Firemen.....	•	•	•	•	•	•	•	•
Maintenance men.....	•	•	•	•	•	•	•	•
Mixers.....	•	•	•	•	•	•	•	•
Sheeters.....	•	•	•	•	•	•	•	•
Dryers.....	•	•	•	•	•	•	•	•
Stackers and bundlers.....	•	•	•	•	•	•	•	•
Shippers.....	•	•	•	•	•	•	•	•
Chemists.....	•	•	•	•	•	•	•	•
Still men.....	•	•	•	•	•	•	•	•
Drum fillers.....	•	•	•	•	•	•	•	•
Loaders and unloaders.....	•	•	•	•	•	•	•	•
Kiln operators.....	•	•	•	•	•	•	•	•
Feeders.....	•	•	•	•	•	•	•	•
Janitors.....	•	•	•	•	•	•	•	•
Beater men.....	•	•	•	•	•	•	•	•
Weighers.....	•	•	•	•	•	•	•	•
Shingle makers.....	•	•	•	•	•	•	•	•

TABLE 75—PERCENT OF WORKERS EXPOSED TO SPECIFIED MATERIALS HAVING INDICATED TYPE OF HAZARD CONTROL—ASPHALT AND ROOFING MATERIAL INDUSTRY

Materials	Number of exposures	Percent of exposed workers having specified control								
		Positive ventilation	Negative ventilation	Local exhaust	Isolation	Wet method	Gas masks	Respirators	Pressure helmets	Other
All specified materials.....	2,701	0.5	15.6	13.4	1.6	3.5	—	13.4	—	0.9
Silicate dust.....	654	2.0	19.0	17.7	—	2.9	—	15.8	—	—
Petroleum.....	474	—	10.5	7.8	4.2	—	—	1.5	—	2.3
Coal tar products.....	358	—	8.4	17.9	4.8	—	—	—	—	3.4
Organic dust.....	187	—	7.0	3.2	—	34.2	—	27.8	—	—
Infection.....	163	—	—	—	—	—	—	—	—	—
Non-siliceous dust.....	125	—	4.0	45.6	—	2.4	—	10.4	—	—
Silica dust.....	101	—	35.6	6.9	—	—	—	57.5	—	—
Asbestos.....	97	—	31.0	3.1	—	—	—	50.0	—	—
Other metals.....	83	—	32.6	1.2	1.2	4.8	—	56.6	—	—
Organic solvents.....	72	—	7.0	5.6	8.3	—	—	—	—	—
Lead.....	70	—	55.7	—	—	—	—	37.2	—	—
Chromium.....	62	—	63.0	—	—	—	—	42.0	—	—
Other gases.....	47	—	—	57.4	—	—	—	—	—	—
Carbon monoxide.....	38	—	—	71.1	—	—	—	—	—	—
Coal dust, bituminous.....	34	—	2.9	—	—	11.8	—	—	—	—
Oil.....	24	—	37.4	12.5	—	—	—	—	—	—
Alkalies.....	21	—	19.0	—	—	—	—	—	—	—
Dermatitis.....	19	—	—	—	—	—	—	—	—	—
Acids, mineral.....	18	—	11.1	—	—	—	—	—	—	—
Chemicals.....	18	—	11.1	—	—	—	—	—	—	—
Sulphur dioxide.....	8	—	—	—	—	—	—	—	—	—
Ink.....	8	—	—	37.5	—	—	—	—	—	—
Halogenated hydrocarbons.....	7	—	—	28.6	—	—	—	—	—	—
Alcohols, esters and ether.....	6	—	100.0	50.0	—	—	—	—	—	—
Antimony.....	3	—	—	—	—	—	—	—	—	—
Paint.....	2	—	—	—	—	—	—	—	—	—
Aldehydes.....	1	—	—	—	—	—	—	—	—	—
Cyanide.....	1	—	—	100.0	—	—	—	—	—	—

TABLE 76—MAJOR EXPOSURES OF THE CHIEF OCCUPATIONS IN THE ASBESTOS INDUSTRY

Number of Workers in Survey.....2215 Number of Workers Exposed.....1603 Percent of Workers Exposed.....72.5% Number of Exposures per Person Exposed..... 2.0								
Occupation	Asbestos dust	Silicate dust	Alkalies	Organic dust	Silica dust	Non-siliceous dust	Petroleum	Other metals
Number of workers exposed.....	1048	509	375	275	216	202	137	100
Percent of workers exposed.....	47.3	23.0	16.9	12.4	9.8	9.1	6.2	4.5
Cement men.....	●	●			●	●		
Foremen and superintendents.....	●	●	●					
Cutters (slitters) (shear men) (sheeters).....	●	●	●	●	●	●	●	
Sanders.....	●	●	●					
Sawers.....	●	●						
Beater men.....	●	●	●	●				
General workers.....	●	●		●		●		●
Roller machine operators.....	●	●		●			●	
Weavers.....	●	●						
Twisters.....	●	●						
Spinners.....	●	●						
Preparers.....	●	●						
Pipe covering makers.....	●	●						
Braiders.....	●	●		●				
Packing makers.....	●	●		●			●	
Tape makers.....	●	●		●				
Mill men.....	●	●		●			●	
Sweepers.....	●	●	●	●	●			
Inspectors.....	●	●		●				
Mixers.....	●	●	●	●	●	●	●	●
Belt men.....	●	●		●			●	
Laborers.....	●	●	●	●	●	●	●	●
Chemists.....	●	●	●					
Fluffers.....	●	●						
Maintenance men.....	●	●		●	●	●	●	●
Molders.....	●	●	●			●		
Driers.....	●	●	●			●		
Finishers.....	●	●	●		●	●		●
Cleaners.....	●	●		●		●		
Canvassers.....	●	●		●		●		
Insulation makers.....	●	●	●					
Pilers.....	●	●	●					
Calender men.....	●	●	●	●		●	●	
Slakers.....	●	●	●					
Crushers (grinders).....	●	●	●	●		●		
Coaters.....	●	●		●		●		

TABLE 77—PERCENT OF WORKERS EXPOSED TO SPECIFIED MATERIALS HAVING INDICATED TYPE OF HAZARD CONTROL—ASBESTOS PRODUCTS INDUSTRY

Materials	Number of exposures	Percent of exposed workers having specified control								
		Positive ventilation	Negative ventilation	Local exhaust	Isolation	Wet method	Gas masks	Respirators	Pressure helmets	Other
All specified materials.....	3,210	0.1	2.7	29.0	0.7	8.2		14.6		4.1
Asbestos.....	1,048		2.2	26.6	0.7	5.6		27.0		2.3
Silicate dust.....	509		1.0	30.0		11.2		7.3		
Alkalies.....	375		2.8	18.4	0.8	12.3		5.6		2.4
Organic dust.....	275			39.0		18.6		5.8		8.7
Silica dust.....	216			22.7		1.9		5.1		
Non-siliceous dust.....	202		3.0	29.2		18.3		21.3		
Petroleum.....	137		3.7	40.0	5.8			9.5		17.5
Other metals.....	100			58.0		1.0		15.0		24.0
Dermatitis.....	76									
Lead.....	66			51.5				7.6		36.4
Organic solvents.....	33	6.0	18.2	30.3				9.1		
Other gases.....	29		3.4	24.2	20.7					
Acids, mineral.....	20		50.0	50.0						
Chemicals.....	17		58.8							
Paint.....	17							17.7		
Sulphur.....	16			50.0				31.2		
Coal dust, bituminous.....	12									
Other salts.....	11			9.1				9.1		
Chromium.....	9			44.4				55.5		
Manganese.....	7			85.8		14.3				
Carbon monoxide.....	7		14.3	100.0						
Oil.....	7									
Coal tar products.....	6		100.0	16.7						
Ink.....	5									60.0
Alcohols, esters and ether.....	3		33.3	66.6						
Halogenated hydrocarbons.....	3									
Accelerators.....	2									
Lacquer.....	2		50.0	100.0						

TABLE 78—MAJOR EXPOSURES OF THE CHIEF OCCUPATIONS IN THE ABRASIVE WHEEL AND PAPER INDUSTRY

Number of Workers in Survey.....	139
Number of Workers Exposed.....	102
Percent of Workers Exposed.....	73.5
Number of Exposures per Person Exposed.....	3.1

Occupation	Non-siliceous dust	Silicate dust	Other metals	Silicon dust	Coal tar products	Alkalies	Carbon monoxide	Other gases	Oil	Petroleum
Number of workers exposed	57	39	35	26	26	25	17	17	16	15
Percent of worker exposed	41.0	28.1	25.2	18.7	18.7	18.0	12.2	12.2	11.5	10.8
Mixers.....	●	●	●	●	●	●			●	●
Molders.....	●	●	●	●	●	●	●			
Metal cleaners.....	●	●	●	●	●	●		●		
Helpers.....	●	●	●	●	●	●				
Weighmen.....	●	●	●	●	●	●			●	●
Packers.....	●	●	●	●	●	●			●	
Pressmen.....	●	●	●	●	●	●			●	
Perforators.....	●	●	●	●	●	●			●	
Foreman and superintendent.....	●	●	●	●	●	●			●	
Mechanics (set-up men).....	●	●	●	●	●	●			●	
Machinists.....	●	●	●	●	●	●			●	
Finishers.....	●	●	●	●	●	●			●	
Turners.....	●	●	●	●	●	●			●	
Mangle operator.....	●	●	●	●	●	●			●	
Abrasive disc machine operator.....	●	●	●	●	●	●			●	

TABLE 79—PERCENT OF WORKERS EXPOSED TO SPECIFIED MATERIALS HAVING INDICATED TYPE OF HAZARD CONTROL—ABRASIVE WHEEL AND PAPER INDUSTRY

[illegible]

CLOTHING INDUSTRIES

Clothing Industries

The clothing industries were represented by 13,244 workers in 103 plants. These workers were in the following classifications: corset factories; gloves and mittens; hats; shirts, collars and cuffs; suits, coats and overalls; dresses and light clothing; furs; rubber coats, and miscellaneous industries. The greatest number of workers surveyed were in the suits, coats and overalls, and dresses and light clothing industries. Of the 13,244 workers, 26.7 per cent were exposed, and each exposed worker averaged 1.2 exposures to specified materials. The major exposure was organic dust. These results are to be expected in the clothing industries as these industries are comparatively non-hazardous. It was found that 28 of the 49 specified materials, used to record exposures, occurred in this industry. Table 80 reveals the number and per cent of workers exposed to specified materials. Table 81 reveals the number and percentage of total exposures to specified materials, or, in other words, the distribution of each exposure. This table shows that the chief exposure to organic dust occurred in the suit, coat and overall industry. Table 82 reveals the extent to which control measures have been applied. Positive general ventilation was found to be the most prevalent type of control measure.

Corset Factories: The corset industry was represented by 975 workers in seven plants. Of these 975 workers, only 6.9 per cent were exposed, and each exposed worker averaged 1.3 exposures to specified materials. The major exposures were organic dust and organic solvents, but both of these exposures were small as only 45 workers were exposed to organic dust and 23 workers exposed to organic solvents. It was found that eight of the 49 specified materials, used to record exposures, occurred in this industry. Table 83 reveals the major exposures of the chief occupations in this industry. Table 84 reveals the extent to which control measures have been applied. Negative general ventilation and respirators were found to be the most prevalent type of control measures.

Gloves and Mittens Industry: The gloves and mittens industry was represented by 1,723 workers in eight plants. Of these 1,723 workers, 44.7 per cent were exposed, and each exposed worker averaged 1.1 exposures to specified materials. The major exposures were organic dust and infection. It was found that 18 of the 49 specified materials, used to record exposures, occurred in this industry. Table 85 reveals the major exposures to chief occupations in this industry. Table 86 reveals the extent to which control measures have been applied. Little use of control measures of any type were found in this industry.

Hat Industry: The hat industry is represented by 732 workers in 12 plants. Of these 732 workers, 33.2 per cent were exposed, and each exposed worker averaged 1.3 exposures to specified materials. The major exposure was organic dust. It was found that 10 of the 49 specified materials, used to record exposures, occurred in this industry. Table 87 reveals the major exposures of the chief occupations in this industry. Table 88 reveals the extent to which control measures have been applied. Negative general ventilation and local exhaust ventilation were found to be the most prevalent types of control measures in this industry.

Shirts, Collars and Cuffs Industry: The shirts, collars and cuffs industry is represented by 379 workers in five plants. Of these 379 workers, 16.4 per cent were exposed, and each exposed worker averaged 1.1 exposures to specified ma-

terials. The major exposure was organic dust. It was found that six of the 49 specified materials, used to record exposures, occurred in this industry. Table 89 reveals the major exposures in the chief occupations of this industry. Table 90 reveals the extent to which control measures have been applied. Negative general ventilation was found to be the only type of control measure in this industry.

Suits, Coats and Overall Industry: The suits, coats and overall industry is represented by 4,294 workers in 23 plants. Of these 4,294 workers, 38.6 per cent were exposed, and each exposed worker averaged 1.2 exposures to specified materials. The major exposure was organic dust. It was found that 10 of the 49 specified materials, used to record exposures, occurred in this industry. Table 91 reveals the major exposures in the chief occupations of this industry. Table 92 reveals the extent to which control measures have been applied. It was found that positive general ventilation was the most prevalent type of control measure in this industry.

Dresses and Light Clothing Industry: The dresses and light clothing industry was represented by 4,890 workers in 39 plants. Of these 4,890 workers, 12.7 per cent were exposed, and each exposed worker averaged 1.1 exposures to specified materials. The major exposure was organic dust. It was found that 14 of the 49 specified materials, used to record exposures, occurred in this industry. Table 93 reveals the major exposures of the chief occupations in this industry. Table 94 reveals the extent to which control measures have been applied. None of the recognized control measures had any wide application in this industry.

Fur Industry: The fur industry was represented by seven workers in one plant. This sample was not deemed of sufficient size to make any analyses.

Rubber Coat Industry: The rubber coat industry was represented by 43 workers in three plants. This sample also was not deemed of sufficient size to make any analyses.

TABLE 80.—CLOTHING INDUSTRIES—EXPOSURES TO SPECIFIED MATERIALS

Materials	Number and percent of workers exposed																			
	All clothing industries in survey		Corset factories		Gloves and mittens		Hats		Shirts, collars and cuffs		Suits, coats and overalls		Dresses and light clothing		Furs		Rubber coats		Other	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Total number of workers.....	13,244		975		1,723		732		379		4,294		4,890		7		43		201	
Number of plants.....	103		7		8		12		5		23		39		1		3		5	
Acids, organic.....	5	*					2	*					3	*						
Acids, mineral.....	5	*																		
Aldehydes.....	1	*											1	*					1	0.5
Alkalis.....	20	*					3	*					13	*					2	1.0
Anilines.....	2	*																		
Cyanides.....	3	*											3	*						
Coal dust, bituminous.....	40	*	2	*	9	0.5					20	0.5	9	*						
Silica dust.....	63	0.5									16	*		*						
Silicate dust.....	39		2	*	32	1.9	37	5.1	1	*										
Non-siliceous dust.....	3342	25.2	45	4.6	548	31.8	174	23.8	55	14.5	1887	44.0	526	10.7	3	42.8			104	51.8
Organic dust.....	13	*			3	*							7	*			2	4.7	1	0.5
Dye.....	47	*					12	1.6	5	1.3	22	0.5	8	*						
Carbon monoxide.....	91	0.7			1	*	43	5.9	5	1.3	22	0.5	19	*					1	0.5
Other gases.....	5	*																		
Lead.....	5	*																		
Antimony.....	1	*	2	*	2	*			1	*										
Other metals.....	5	*																		
Nitrogen oxides.....	1	*																		
Infection.....	213	1.6			195	11.3					12	*			6	85.8				
Alcohols, esters and ether.....	11	*					8	1.1									2	4.7	1	0.5
Halogenated hydrocarbons.....	17	*	4	*							4	*	2	*						
Ink.....	17	*	4	*	6	*	2	*			5	*			7	100				
Lacquer.....	9	*					9	1.2												
Oil.....	19	*			16	0.9														
Organic solvents.....	90	0.7	23	2.4	8	0.5	36	4.8			10	*	5	*	3	42.8	2	4.7	1	0.5
Petroleum.....	87	0.7	4	*	8	0.5			1	*	8	*	66	1.3			3	6.9	2	1.0
Paint.....	1	*			1	*														
Other salts.....	2	*											2	*						

*—Denotes less than 1/2 of 1%

TABLE 82.—PERCENT OF WORKERS EXPOSED TO SPECIFIED MATERIALS HAVING INDICATED TYPE OF HAZARD CONTROL—CLOTHING INDUSTRIES

[illegible]

TABLE 83—MAJOR EXPOSURES OF THE CHIEF OCCUPATIONS IN THE CORSET INDUSTRY

Number of Workers in Survey.....	975
Number of Workers Exposed.....	67
Percent of Workers Exposed.....	6.9%
Number of Exposures per Person Exposed.....	1.8

Occupation	Organic dust	Other organic solvents
Number of workers exposed.....	45	23
Percent of workers exposed.....	4.6	2.4
Cutters.....	●	●
Machine operators.....	●	
Inspectors.....	●	●
Packers.....	●	
Porters (sweeper-cleaner).....	●	

TABLE 84—PERCENT OF WORKERS EXPOSED TO SPECIFIED MATERIALS HAVING INDICATED TYPE OF HAZARD CONTROL—CORSET INDUSTRY

[illegible]

TABLE 85—MAJOR EXPOSURES OF THE CHIEF OCCUPATIONS IN THE
GLOVE AND MITTEN INDUSTRY

Number of Workers in Survey.....	1723
Number of Workers Exposed.....	771
Percent of Workers Exposed.....	44.7%
Number of Exposures per Person Exposed.....	1.1

Occupation	Organic dust	Infections	Silicate dust
Number of workers exposed.....	548	195	32
Percent of workers exposed.....	31.8	11.3	1.9
Cutters.....	●	●	●
Shapers.....	●	●	●
Sweepers and balers.....	●	●	●
Machine operators.....	●	●	●
Inspectors.....	●	●	●
Pressers.....	●	●	●
Turners.....	●	●	●
Checkers.....	●	●	●
Sorters.....	●	●	●
Stakers.....	●	●	●
Spreaders.....	●	●	●
Stockmen.....	●	●	●
Foremen.....	●	●	●

TABLE 86—PERCENT OF WORKERS EXPOSED TO SPECIFIED MATERIALS HAVING INDICATED
TYPE OF HAZARD CONTROL—GLOVE INDUSTRY

Materials	Number of exposures	Percent of exposed workers having specified control								
		Positive ven-tilation	Negative ven-tilation	Local exhaust	Isola-tion	Wet method	Gas masks	Respi-rators	Pressure helmets	Other
All specified materials...	845			0.7		0.2				
Organic dust.....	548			0.4						
Infection.....	195									
Silicate dust.....	32					6.3				
Oil.....	16									
Coal dust, bituminous.....	9									
Organic solvents.....	8									
Petroleum.....	8									
Ink.....	6									
Acids, mineral.....	5			20.0						
Lead.....	5									
Dye.....	3									
Alkalies.....	3									
Other metals.....	2			50.0						
Non-siliceous dust.....	1			100.0						
Other gases.....	1									
Antimony.....	1									
Paint.....	1									
Nitrogen oxides.....	1			100.0						

TABLE 93—MAJOR EXPOSURES OF THE CHIEF OCCUPATIONS IN THE DRESSES AND LIGHT CLOTHING INDUSTRY

Number of Workers in Survey.....	4890
Number of Workers Exposed.....	620
Percent of Workers Exposed.....	12.7%
Number of Exposures per Persons Exposed.....	1.1

Occupation	Organic Dust	Petroleum
Number of workers exposed.....	526	66
Percent of workers exposed.....	10.7	1.3
Cutters.....	●	
Sewers.....	●	
Pressers.....	●	
Finishers.....	●	
Foreladies.....	●	
Drapers.....	●	
Basters.....	●	
Porters (sweepers).....	●	
Maintenance men.....	●	●
Set-up men.....	●	●
Machinists.....		●

TABLE 94—PERCENT OF WORKERS EXPOSED TO SPECIFIED MATERIALS HAVING INDICATED TYPE OF HAZARD CONTROL—DRESSES AND LIGHT CLOTHING INDUSTRY

[illegible]

FOOD AND ALLIED INDUSTRIES

Food and Allied Industries

The food industries were represented by 23,988 workers in 276 plants. These workers were in the following classification: bakeries; dairy products; confectionery; fish curing and packing; flour and grain mills; fruit and vegetables; slaughter and packing; ice manufacturing; spices and coffee; beverages and liquors, and miscellaneous industries. The largest number of workers surveyed were in the bakeries; confectionery and slaughtering, and packing house industries. Of the 23,988 workers surveyed, 71.7 per cent were exposed, and each exposed worker averaged 1.5 exposures to specified materials. The major exposures were dermatitis producers, organic dust and infection. It was found that 38 of the 49 specified materials, used to record exposures, occurred in this industry. Table 95 reveals the number and per cent of workers exposed to specified materials. Table 96 reveals the number and percentage of total exposures to specified materials, or, in other words, distribution of each exposure. This table shows that the chief exposure to dermatitis producers occurred in the confectionery industry; the chief exposure to organic dust occurred in the bakery industry; and the chief exposure to infection was in the slaughter and packing house industry. Table 97 reveals the extent to which control measures have been applied. It was found that negative and positive ventilation and local exhaust ventilation were the most prevalent types of control measures in these industries.

Bakery Industry: The bakery industry was represented by 6,057 workers in 65 plants. Of these 6,057 workers, 63.0 per cent were exposed, and each exposed worker averaged 1.7 exposures to specified materials. The major exposures were dermatitis producers and organic dust. It was found that 23 of the 49 specified materials, used to record exposures, occurred in this industry. Table 98 reveals the major exposures of the chief occupations in this industry. Table 99 reveals the extent to which control measures have been applied. Negative general ventilation and local exhaust ventilation were found to be the most prevalent types of control measures.

Dairy Products Industry: The dairy products industry was represented by 1,036 workers in 38 plants. Of these 1,036 workers, 39.0 per cent were exposed, and each exposed worker averaged 1.8 exposures to specified materials. The major exposures were alkalis, chlorine and dermatitis producers. It was found that 24 of the 49 specified materials, used to record exposures, occurred in this industry. Table 100 reveals the major exposures to chief occupations in this industry. Table 101 reveals the extent to which control measures have been applied. Negative general ventilation was found to be the most prevalent type of control measure in this industry.

Confectionery Industry: The confectionery industry was represented by 5,006 workers in 27 plants. Of these 5,006 workers, 73.8 per cent were exposed, and each exposed worker averaged 1.3 exposures to specified materials. The major exposures were dermatitis producers and organic dust. It was found that 25 of the 49 specified materials, used to record exposures, occurred in this industry. Table 102 reveals the major exposures of the chief occupations in this industry. Table 103 reveals the extent to which control measures have been applied. Positive and negative general ventilation were found to be the most prevalent types of control measures in this industry.

Fish Curing and Packing Industry: The fish curing and packing industry was represented by 54 workers in five plants. This was not deemed a sufficient sample to warrant an analysis.

Flour and Grain Mills: The flour and grain industry was represented by 1,225 workers in 18 plants. Of these 1,225 workers, 84.4 per cent were exposed, and each exposed worker averaged 1.3 exposures to specified materials. The major exposure was organic dust. It was found that 22 of the 49 specified materials, used to record exposures, occurred in this industry. Table 104 reveals the major exposures of the chief occupations in this industry. Table 105 reveals the extent to which control measures have been applied. Local exhaust ventilation was found to be the most prevalent type of control measure in this industry.

Fruit and Vegetable Industry: The fruit and vegetable industry was represented by 436 workers in 8 plants. Of these 436 workers, 60.6 per cent were exposed, and each exposed worker averaged 1.2 exposures to specified materials. The major exposures were dermatitis producers and organic acids. It was found that 14 of the 49 specified materials, used to record exposures, occurred in this industry. Table 106 reveals the major exposures of the chief occupations in this industry. Table 107 reveals the extent to which control measures have been applied. Negative general ventilation was found to be the most prevalent type of control measure in this industry.

Slaughter and Packing Industry: The slaughter and packing industry was represented by 4,900 workers in 38 plants. Of these 4,900 workers, 82.4 per cent were exposed, and each exposed worker averaged 1.3 exposures to specified materials. The major exposure was infections. It was found that 31 of the 49 specified materials, used to record exposures, occurred in this industry. Table 108 reveals the major exposures of the chief occupations in this industry. Table 109 reveals the extent to which control measures have been applied. Negative general ventilation and protective clothing, such as boots, gloves and aprons, were found to be the most prevalent types of control measures in this industry.

Ice Manufacturing Industry: The ice manufacturing industry was represented by 263 workers in eight plants. Of these 263 workers, 35.3 per cent were exposed, and each exposed worker averaged 1.4 exposures to specified materials. The major exposures were gases and infection. It was found that 12 of the 49 specified materials, used to record exposures, occurred in this industry. Table 110 reveals the major exposures of the chief occupations in this industry. Table 111 reveals the extent to which control measures have been applied. Isolation and gas masks were found to be the most prevalent type of control measures in this industry.

Coffee, Spices, etc. Industry: The coffee, spices, etc. industry was represented by 515 workers in 11 plants. Of these 515 workers, 62.0 per cent were exposed, and each exposed worker averaged 1.5 exposures to specified materials. The major exposures were organic dust, dermatitis producers, and alcohol-esters and ethers. It was found that 23 of the 49 specified materials, used to record exposures, occurred in this industry. Table 112 reveals the major exposures of the chief occupations in this industry. Table 113 reveals the extent to which control measures have been applied. Local exhaust ventilation was found to be the most prevalent type of control measure in this industry.

Beverages and Liquor Industry: The beverage and liquor industry was represented by 3,408 workers in 30 plants. Of these 3,408 workers, 78.0 per cent were exposed, and each exposed worker averaged 1.4 exposures to specified materials. The major exposure was alcohols, esters and ethers. It was found that 28 of the 49 specified materials, used to record exposures, occurred in this industry. Table 114 reveals the major exposures of the chief occupations in this industry. Table 115 reveals the extent to which control measures have been applied. Isolation was found to be the most prevalent type of control measure in this industry.

TABLE 95.—FOOD INDUSTRIES—EXPOSURES TO SPECIFIED MATERIALS

Materials	Number and percent of workers exposed																							
	All food industries in survey		Bakeries		Dairy products		Confectionery		Fish curing and packing		Flour and grain mills		Fruits and vegetables		Slaughter and packing		Ice manu- facturing		Spices coffee, etc.		Beverages and liquors		Other	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Total number of workers.....	23,988		6,057		1,036		5,006		54		1,225		436		4,900		263		515		3,408		1,085	
Number of plants.....	276		65		38		27		5		18		8		38		8		11		30		28	
Acids, organic.....	290	1.2	1	*	1	*	15	*	3	5.1	1	*	97	22.2	43	0.9	1	*	3	0.6	55	1.6	129	11.8
Acids, mineral.....	211	0.9	9	*	36	3.5	20	*	9	16.7	19	1.6	7	1.6	22	0.5	1	*	6	1.2	44	1.3	37	3.4
Aldehydes.....	699	2.9	26	*	206	19.7	59	1.2	8	14.8	8	*	3	0.7	169	3.5	13	2.9	13	2.5	385	11.3	127	11.7
Alkalies.....	899	3.7	200	3.3	12	1.2	9	*	14	26.2	14	1.1	1	*	9	0.2	14	3.1	15	2.9	198	5.8	41	3.8
Chemicals.....	106	0.4	3	*	12	1.2	9	*	7	12.9	11	0.9	1	*	59	1.2	4	0.8	4	0.8	40	1.2	14	1.3
Coal tar products.....	168	0.7	4	*	27	2.6	4	*	4	7.4	11	0.9	1	*	59	1.2	1	*	1	*	1	*	2	0.2
Cyanides.....	6	0.0	1	*	27	2.6	41	0.8	1	*	40	3.3	8	1.8	56	1.1	17	6.5	5	1.0	50	1.5	13	1.2
Coal dust, bituminous.....	345	1.4	88	1.5	27	2.6	41	0.8	1	*	40	3.3	8	1.8	56	1.1	17	6.5	5	1.0	50	1.5	13	1.2
Coal dust, anthracite.....	1	0.0	1	*	1	*	1	*	1	*	1	*	1	*	1	*	1	*	1	*	1	*	1	1.3
Silica dust.....	347	1.5	97	1.6	27	2.6	32	0.6	27	2.6	27	2.2	7	1.6	85	1.7	9	3.4	6	1.2	43	1.3	14	1.3
Silicate dust.....	41	0.2	3	*	3	*	15	*	20	37.1	12	1.0	13	3.0	11	0.2	11	1.7	142	27.6	330	9.7	236	21.7
Non-siliceous dust.....	4538	18.9	1848	30.5	16	1.6	835	16.7	4	7.4	947	77.3	13	3.0	151	3.1	13	13.4	50	9.7	3	0.1	13	1.2
Organic dust.....	112	0.5	1	*	29	2.8	29	0.6	38	72.3	16	1.3	114	26.2	169	3.5	13	13.4	69	13.4	77	2.3	388	35.7
Dye.....	6602	27.6	2629	43.4	76	7.3	3026	60.5	38	72.3	16	1.3	114	26.2	169	3.5	13	13.4	69	13.4	77	2.3	388	35.7
Dermatitis.....	35	0.1	1	*	1	*	1	*	1	*	1	*	1	*	1	*	1	*	1	*	1	*	1	1.9
Fluorides.....	907	3.8	539	8.9	34	3.3	131	2.6	22	40.8	23	2.0	1	*	115	2.3	30	6.6	12	2.3	9	0.8	21	1.9
Carbon monoxide.....	30	0.1	1	*	1	*	1	*	1	*	1	*	1	*	1	*	1	*	1	*	1	*	1	5.8
Hydrogen sulphide.....	26	0.1	1	*	1	*	1	*	1	*	1	*	1	*	1	*	1	*	1	*	1	*	1	5.8
Sulphur dioxide.....	1327	5.5	503	8.3	54	5.2	229	4.6	9	16.7	30	2.5	5	1.2	83	1.7	51	19.4	13	2.5	287	8.5	63	5.8
Other gases.....	162	0.7	5	*	94	9.1	2	*	37	3.0	37	3.0	1	*	20	0.4	4	1.5	4	0.8	4	0.8	4	0.8
Chlorine.....	4	0.0	1	*	1	*	1	*	1	*	1	*	1	*	1	*	1	*	1	*	1	*	1	1.9
Chromium.....	3	0.0	1	*	1	*	1	*	1	*	1	*	1	*	1	*	1	*	1	*	1	*	1	1.9
Mercury.....	137	0.6	12	*	10	1.0	14	*	10	0.8	10	0.8	1	*	45	0.9	4	1.5	9	1.8	29	0.9	4	0.8
Lead.....	7	0.0	1	*	1	*	1	*	1	*	1	*	1	*	1	*	1	*	1	*	1	*	1	5.8
Antimony.....	162	0.7	60	1.0	14	1.4	11	*	5	9.1	5	0.4	1	*	19	0.4	3	1.1	7	1.4	25	0.7	18	1.7
Other metals.....	3542	14.8	30	3.8	30	3.8	2	*	16.7	16.7	16.7	16.7	16.7	16.7	3473	70.8	25	9.5	66	12.8	2033	59.6	22	2.0
Infection.....	2148	9.0	13	*	1	*	4	*	9	16.7	9	0.8	2	*	1	*	1	*	4	0.8	3	0.1	1	0.1
Alcohols, esters and ether.....	8	0.0	1	*	1	*	1	*	1	*	1	*	1	*	1	*	1	*	1	*	1	*	1	0.6
Halogenated hydrocarbons.....	27	0.1	1	*	1	*	1	*	1	*	1	*	1	*	1	*	1	*	1	*	1	*	1	0.6
Ink.....	47	0.2	13	*	18	1.8	15	*	18	1.8	2	0.2	18	1.8	18	0.4	2	0.0	4	0.8	13	0.4	3	0.3
Lacquer.....	12	0.0	1	*	1	*	1	*	1	*	1	*	1	*	1	*	1	*	1	*	1	*	1	0.6
Medicinals.....	537	2.2	167	2.8	10	1.0	47	0.9	10	18.2	7	0.6	101	21.1	36	0.7	1	*	7	1.4	12	0.3	189	17.4
Oil.....	211	0.9	89	1.5	17	1.6	17	*	5	9.1	5	0.4	36	0.7	36	0.7	1	*	10	1.9	12	0.3	24	2.2
Organic solvents.....	363	1.5	235	3.9	34	3.3	92	1.8	50	18.2	63	5.1	2	0.2	50	1.1	7	2.7	5	0.9	55	1.6	19	1.8
Petroleum.....	66	0.3	8	0.1	17	1.7	4	*	2	3.7	2	0.2	3	0.7	19	0.4	1	*	4	0.8	6	0.2	9	0.8
Paint.....	940	3.9	39	0.6	1	0.1	34	0.7	32	59.3	18	1.5	59	13.5	547	11.2	7	2.7	17	3.3	1	0.0	179	16.5
Other salts.....	4	0.0	1	*	1	*	1	*	1	*	1	*	1	*	1	*	1	*	1	*	1	*	1	0.6
Sulphur.....	4	0.0	1	*	1	*	1	*	1	*	1	*	1	*	1	*	1	*	1	*	1	*	1	0.6

*—Denotes less than 1/4 of 1%.

TABLE 96--FOOD INDUSTRIES--EXPOSURES TO SPECIFIC MATERIALS

Materials	All food industries in survey	Number and percentage of total exposures to the specified materials																							
		Bakeries		Dairy products		Confectionery		Fish and packing		Flour and grain mills		Fruits and vegetables		Slaughter and packing		Ice manufacturing		Spices coffee, etc.		Beverages, liquors		Other			
		No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%		No.	%	
Total number of workers.....	23,988	6,057		1,036		5,006		54		1,225		436		4,900		263		515		3,408		1,088			
Total number of exposures.....	25,211	6,589		745		4,774		150		1,306		321		5,355		130		475		3,774		1,592			
Acids, organic.....	290	1	0.4	1	0.4				3	1.0	1	0.4	97	33.4					3	1.0	55	18.9	129	44.5	
Acids, mineral.....	211	9	4.3	36	17.2	15	7.1			19	9.8	1	0.5	43	20.3	1	0.5	6	2.8	44	20.8	37	18.3		
Aldehydes.....	609	26	4.3			20	3.3					7	1.2	7	3.6			13	2.1	385	63.2	127	20.8		
Alkalies.....	899	200	22.2	206	22.4	59	6.6			8	0.9	3	0.5	169	18.8			15	1.9	198	22.1	41	4.6		
Amines.....	106	3	2.8	12	11.3	9	8.5			14	13.2	1	0.9	9	8.5			4	3.8	40	37.8	14	13.2		
Chemicals.....	168	4	2.4			87	51.8			2.4	11	6.5			59	35.2			1				2	1.2	
Coal tar products.....	6					4	66.6																		
Cyanides.....	345	88	25.5	27	7.8	41	11.8			40	11.6	8	2.3	56	16.3	17	4.9	5	1.5	50	14.6	13	3.7		
Coal dust, bituminous.....	31			1	100.0																				
Coal dust, anthracite.....	347	97	28.4	27	7.8	32	9.3			27	7.8	7	0.2	85	25.4	9	2.6	1	3.2	15	48.4	14	45.2		
Silica dust.....	41			3	7.3	15	36.6							11	26.8			6	1.7	43	12.4	14	4.4		
Non-siliceous dust.....	4,538	1848	41.0	16	0.4	835	18.4			0.4	947	20.8	13	0.3	151	3.3			142	3.0	330	7.2	236	5.2	
Organic dust.....	112					29	26.1			4	3.6			12	10.8			50	45.0	3	2.8	13	11.6		
Dye.....	6,402	2628	38.9	76	1.2	3026	45.8			38	0.6	16	0.2	114	1.7	169	2.6			77	1.2	388	5.7		
Dermatitis.....	35																	69	1.1	34	97.1	1	2.3		
Fluorides.....	907	539	59.4	34	3.8	131	14.5			22	2.4	23	2.5	1	0.1	115	12.6			15	57.7	1	3.9		
Carbon monoxide.....	30									9	34.6					30	100.0			15	57.7	63	4.6		
Sulphur dioxide.....	1,327	503	37.8	54	4.1	229	17.3			30	2.8	5	0.4	83	6.3	51	3.8			287	21.7				
Other gases.....	162	5	3.1	94	58.2	2	1.2			37	22.8			20	12.3					4	2.4				
Chlorine.....	4																								
Chromium.....	3			3	100.0																				
Mercury.....	137	12	8.7	10	7.3	14	10.2			10	7.3			45	32.9	4	2.9	9	6.6	29	21.2	4	2.9		
Lead.....	7																								
Antimony.....	162	60	37.0	14	8.7	11	6.8			5	3.1			19	11.8	3	1.9	7	4.2	25	15.4	18	11.1		
Other metals.....	3,542			39	1.1	2	0.1							3473	97.9	23	0.8			3	0.1	22	1.0		
Infection.....	2,148	13	0.6	3	0.1	4	50.0			9	0.4			2	0.1					2033	94.6		23		
Alcohols, esters and ether.....	8			1	12.5									1	12.5										
Halogenated hydrocarbons.....	27					15	55.6			2	7.4			12	47.4										
Ink.....	47	13	27.7											18	38.3	5	41.7			4	14.8	3	11.1		
Lacquer.....	12													6	50.0					13	27.7	7	58.3		
Medicinals.....	587	167	31.1	19	3.5	47	8.8			7	1.3			101	18.8			7	1.3			189	33.2		
Oil.....	211	89	42.3	17	8.1	17	8.1			5	2.4			36	17.0	1	0.5	10	4.7	55	26	24	11.4		
Organic solvents.....	563	235	41.6	34	6.0	92	16.2			63	13.2	3	0.5	50	10.9	7	1.2	5	0.9	11	2.4	19	3.7		
Petroleum.....	66	8	12.1	11	16.7	4	6.1			2	3.0	2	3.0	19	28.8	7	1.5	6	9.1	1	1.5	9	13.6		
Paint.....	940	39	3.6	7	0.8	34	3.4			32	3.2	18	1.9	59	6.3			17	1.8			1	0.1		
Other salts.....	4																								
Sulphur.....																									

TABLE 97—PERCENT OF WORKERS EXPOSED TO SPECIFIED MATERIALS HAVING INDICATED TYPE OF HAZARD CONTROL—FOOD INDUSTRIES

[illegible]

TABLE 98—MAJOR EXPOSURES OF THE CHIEF OCCUPATIONS IN THE BAKERY INDUSTRY

Number of Workers in Survey.....	6057
Number of Workers Exposed.....	3818
Percent of Workers Exposed.....	63.0%
Number of Exposures per Person Exposed.....	1.7

Occupation	Dermatitis producers	Organic dust	Carbon monoxide	Other gases	Petroleum	Oils	Alkalies
Number of workers exposed.....	2,629	1,848	539	503	235	200	167
Percent of workers exposed.....	43.4	30.5	8.9	8.3	3.9	3.3	2.8
Bakers and helpers.....	●	●	●	●		●	●
Laborers.....	●	●					
Mixers (dough workers, dough breaker, roller, etc.).....	●	●				●	●
Foremen.....	●	●					
Icers.....	●	●					
Packers.....	●	●			●	●	
Wrappers.....	●	●					
Fruit chopper.....	●	●					
Filler.....	●	●					
Cleaners.....	●	●					
Jam makers.....	●	●					
Porters.....	●	●					
Crust maker.....	●	●					●
Make-up men.....	●	●					
Pastry maker.....	●	●					
Oven men.....	●	●	●	●			●
Greasers.....	●	●				●	●
Machine operators.....	●	●					
Rackers.....	●	●					
Cookers.....	●	●					
Divider men.....	●	●					
Bench men.....	●	●					
Truck drivers.....	●	●	●	●			
Engineers and firemen.....	●	●		●			
Washers and cleaners.....	●	●			●		●
Maintenance men.....	●	●			●		
Car greasers.....	●	●	●	●	●		
Fryers.....	●	●		●			

TABLE 99—PERCENT OF WORKERS EXPOSED TO SPECIFIED MATERIALS HAVING INDICATED TYPE OF HAZARD CONTROL—BAKERY INDUSTRY

[illegible]

TABLE 100—MAJOR EXPOSURES OF THE CHIEF OCCUPATIONS IN THE DAIRY PRODUCTS INDUSTRY

Number of Workers in Survey.....	1036
Number of Workers Exposed.....	404
Percent of Workers Exposed.....	39.0%
Number of Exposures per Persons Exposed.....	1.8

Occupation	Alkalies	Chlorine	Dermatitis producers	Gas	Infections	Mineral acids	Petroleum
Number of workers exposed.....	206	94	76	54	39	36	34
Percent of workers exposed.....	19.7	9.1	7.3	5.2	3.8	3.5	3.3
Washers.....	•	•		•	•		
Bottlers.....	•	•					
Laborers.....	•	•					
Pasteurizers.....	•	•					
Chemists (testers).....	•	•				•	
Helpers.....	•	•			•		
Receivers.....	•	•					
Packers and unpackers.....			•				
Mixers.....			•				
Ice cream makers.....		•	•	•			
Butter makers.....		•	•	•			
Dairy men.....	•	•	•	•			
Freezers.....			•	•			
Maintenance men.....		•		•			•

TABLE 101—PERCENT OF WORKERS EXPOSED TO SPECIFIED MATERIALS HAVING INDICATED TYPE OF HAZARD CONTROL—DAIRY PRODUCTS INDUSTRY

Materials	Number of exposures	Percent of exposed workers having specified control								
		Positive ventilation	Negative ventilation	Local exhaust	Isolation	Wet method	Gas masks	Respirators	Pressure helmets	Other
All specified materials.....	745	2.0	20.2	3.1	6.6	1.5	1.1	0.3		2.4
Alkalies.....	206	7.3	37.4	6.3	9.7					1.9
Chlorine.....	94		24.5	4.3	1.1					
Dermatitis.....	76		33.0							
Other gases.....	54		7.4	1.9	46.3		14.8			
Infection.....	39		15.4							23.1
Acids, mineral.....	36		19.5							8.3
Carbon monoxide.....	34		2.9	5.9						
Petroleum.....	34		2.9							2.9
Silicate dust.....	27		3.7			14.8				
Coal dust, bituminous.....	27		3.7			3.7				
Oil.....	19		21.0							
Organic solvents.....	17							5.9		
Organic dust.....	16			18.7						
Other metals.....	14					21.4				
Chemicals.....	12									
Paint.....	11							9.1		
Lead.....	10									
Other salts.....	7									
Non-siliceous dust.....	3					100.0				
Mercury.....	3				66.7					
Alcohols, esters and ether.....	3									
Acids, organic.....	1		100.0							100.0
Coal dust, anthracite.....	1									
Halogenated hydrocarbons.....	1				100.0					

TABLE 104—MAJOR EXPOSURES OF THE CHIEF OCCUPATIONS IN THE FLOUR AND GRAIN INDUSTRY

Number of Workers in Survey.....	1225
Number of Workers Exposed.....	1033
Percent of Workers Exposed.....	84.4%
Number of Exposures per Person Exposed.....	1.3

Occupation	Organic dust	Petroleum	Chlorine	Other gases
Number of workers exposed.....	947	63	37	30
Percent of workers exposed.....	77.3	5.1	3.0	2.5
Unloaders and loaders.....	●			
Laborers and general helpers.....	●	●		
Millers (grinder).....	●	●	●	
Oilers.....	●			
Janitors.....	●			
Truckers (handlers).....	●	●		
Packers and fillers.....	●			
Maintenance men.....	●	●		
Mixers.....	●			●
Warehouse tenders.....	●		●	
Chemists.....	●			
Foremen.....	●			
Screeners.....	●			
Bleachers.....	●		●	
Bag cleaners.....	●			
Kiln men.....	●			●
Malsters.....	●			●

TABLE 105—PERCENT OF WORKERS EXPOSED TO SPECIFIED MATERIALS HAVING INDICATED TYPE OF HAZARD CONTROL—FLOUR AND GRAIN INDUSTRY

Materials	Number of exposures	Percent of exposed workers having specified control								
		Positive ventilation	Negative ventilation	Local exhaust	Isolation	Wet method	Gas masks	Respirators	Pressure helmets	Other
All specified materials.....	1,306	3.4	4.7	25.3	3.8	1.6	0.2	1.5		
Organic dust.....	947	8.4	1.8	29.7	1.6	0.3		2.1		
Petroleum.....	63									
Coal dust, bituminous.....	40					17.5				
Chlorine.....	37		10.8	29.7	62.3		8.1			
Other gases.....	30	86.8	86.8	33.3						
Silicate dust.....	27					40.8				
Carbon monoxide.....	23	43.5	43.5	43.5						
Acids, mineral.....	19		5.3	47.3						
Other salts.....	18		5.5	5.5						
Dermatitis.....	16									
Chemicals.....	14									
Non-siliceous dust.....	12									
Coal tar products.....	11				100.0					
Lead.....	10									
Sulphur dioxide.....	9			100.0						
Alkalies.....	8		12.5							
Oil.....	7									
Other metals.....	5									
Organic solvents.....	5									
Ink.....	2									
Paint.....	2									
Acids, organic.....	1		100.0							

TABLE 106—MAJOR EXPOSURES OF THE CHIEF OCCUPATIONS IN THE FRUIT AND VEGETABLE PACKING INDUSTRY

Number of Workers in Survey436
 Number of Workers Exposed.....264
 Percent of Workers Exposed.....60.6%
 Number of Exposures per Person Exposed.....1.2

Occupation	Dermatitis producers	Organic acids	Other salts
Number of workers exposed.....	114	97	59
Percent of workers exposed.....	26.2	22.2	13.5
Vinegar men.....	●	●	●
Bottlers.....	●	●	●
Packers and fillers.....	●	●	●
Cutters.....	●	●	●
Sorters.....	●	●	●
Pickle workers.....	●	●	●
Cookers.....	●	●	●
Receivers.....	●	●	●
Peelers.....	●	●	●
Laborers.....	●	●	●

TABLE 107—PERCENT OF WORKERS EXPOSED TO SPECIFIED MATERIALS HAVING INDICATED TYPE OF HAZARD CONTROL—FRUIT AND VEGETABLE PACKING INDUSTRY

Materials	Number of ex- posures	Percent of exposed workers having specified control								
		Positive ven- tilation	Negative ven- tilation	Local exhaust	Isola- tion	Wet method	Gas masks	Respi- rators	Pressure helmets	Other
All specified materials.....	321		15.0	0.6		0.3				4.7
Dermatitis.....	114		42.1							4.4
Acids, organic.....	97									
Other salts.....	59									17.0
Organic dust.....	13									
Coal dust, bituminous.....	8					12.5				
Aldehydes.....	7									
Silicate dust.....	7									
Other gases.....	5			20.0						
Alkalies.....	3									
Petroleum.....	3									
Paint.....	2									
Acids, mineral.....	1									
Chemicals.....	1									
Carbon monoxide.....	1			100.0						

TABLE 108—MAJOR EXPOSURES OF THE CHIEF OCCUPATIONS IN THE SLAUGHTER AND PACKING HOUSE INDUSTRY

Number of Workers in Survey.....	4900
Number of Workers Exposed.....	4033
Percent of Workers Exposed.....	82.4%
Number of Exposures per Person Exposed.....	1.3

Occupation	Infections	Other salts	Dermatitis producers	Alkalies	Organic dust	Carbon monoxide	Oil
Number of workers exposed.....	3473	547	169	169	151	115	101
Percent of workers exposed.....	70.8	11.2	3.5	3.5	3.1	2.3	2.1
Boners.....	•						
Laborers.....	•	•	•	•	•		
Meat grinders.....	•	•	•		•		
Sausage makers.....	•		•		•	•	
Cookers and smokers.....	•		•		•	•	
Butchers.....	•	•	•	•	•		
Stuffers.....	•	•	•		•		
Cutters.....	•		•				
Selectors and graders.....	•	•	•				
Packers and helpers.....	•	•	•				
Trimmers (separators).....	•	•	•				
Skinner (hide removers).....	•		•				
Splitters.....	•			•			
Picklers (salters).....	•	•				•	
Foremen.....	•	•	•		•		
Washers.....	•	•	•	•			
Dehairers.....	•	•	•				
Casing sizars.....	•	•					
Cooler men.....	•	•					
Stockmen.....	•				•		
Pushers.....	•						
Stickers.....	•		•				
Linkers and tiers.....	•	•					
Cleaners.....	•	•	•	•			•
Chemists.....	•			•	•		
Janitors.....	•			•	•		
Tank men.....	•		•	•	•	•	•
Maintenance men.....	•			•	•		•
Renderers.....	•			•	•		•
Lard makers.....	•						•
Dry salt men.....	•	•					•
Soakers.....	•			•			

TABLE 109—PERCENT OF WORKERS EXPOSED TO SPECIFIED MATERIALS HAVING INDICATED TYPE OF HAZARD CONTROL—SLAUGHTER AND PACKING HOUSE INDUSTRY

Materials	Number of exposures	Percent of exposed workers having specified control								
		Positive ventilation	Negative ventilation	Local exhaust	Isolation	Wet method	Gas masks	Respirators	Pressure helmets	Other
All specified materials.....	5,355	1.4	6.5	2.7	1.2	0.4	0.1	0.3		6.3
Infection.....	3,473	0.7	4.8			0.1				4.8
Other salts.....	547		2.9		0.7					16.5
Alkalies.....	169	19.5	10.1		0.6					34.4
Dermatitis.....	169		26.6							1.2
Organic dust.....	151		6.6	2.7	2.0					0.7
Carbon monoxide.....	115		14.8	60.9						
Oil.....	101	3.0	2.0							
Silicate dust.....	85				10.6					
Other gases.....	83		13.3	29.0	51.8		9.6	16.9		
Coal tar products.....	59		5.1	62.8						
Coal dust, bituminous.....	56					30.4				
Petroleum.....	50									
Lead.....	45									17.8
Acids, mineral.....	43									
Organic solvents.....	36		2.8							
Hydrogen sulphide.....	30		83.5							
Aldehydes.....	22		27.2	54.5	18.2					
Chlorine.....	20	80.0	60.0							
Other metals.....	19		10.5					21.0		
Paint.....	19		5.3							42.1
Lacquer.....	18		83.3							11.1
Dye.....	12									25.0
Non-siliceous dust.....	11									
Chemicals.....	9									
Medicinals.....	5									
Alcohols, esters and ether.....	2									
Ink.....	2									
Cyanide.....	1									
Silica dust.....	1					100.0				
Sulphur dioxide.....	1									
Halogenated hydrocarbons.....	1		100.0							

TABLE 110—MAJOR EXPOSURES OF THE CHIEF OCCUPATIONS IN THE ICE MANUFACTURING INDUSTRY

Number of Workers in Survey.....	263
Number of Workers Exposed.....	98
Percent of Workers Exposed.....	35.3%
Number of Exposures per Person Exposed.....	1.4

Occupation	Other gases	Infections	Bituminous coal dust	Silicate dust	Other salts	Petroleum
Number of workers exposed.....	51	25	17	9	7	7
Percent of workers exposed.....	19.4	9.5	6.5	3.4	2.7	2.7
Coal men.....	•		••			
Engineers.....	•		••	••	•	•
Firemen.....	•			•		
Pullers.....	•				•	
Laborers.....	•					
Foremen.....	•					
Oilers.....	•					•
Welders.....	•	•				
Route men.....						

TABLE 111—PERCENT OF WORKERS EXPOSED TO SPECIFIED MATERIALS HAVING INDICATED TYPE OF HAZARD CONTROL—ICE MANUFACTURING INDUSTRY

[illegible]

TABLE 112—MAJOR EXPOSURES OF THE CHIEF OCCUPATIONS IN THE SPICE AND COFFEE INDUSTRY

Number of Workers in Survey.....	515
Number of Workers Exposed.....	319
Percent of Workers Exposed.....	62.0%
Number of Exposures per Person Exposed.....	1.5

Occupation	Organic dust	Dermatitis producers	Alcohols, esters and ethers	Dyes
Number of workers exposed	142	69	66	50
Percent of workers exposed	27.6	13.4	12.8	9.7
Grinders	●	●		
Packers and fillers	●	●		
Foremen	●			
Laborers	●	●		
Millers	●	●		
Roasters	●			
Screeners	●			
Blenders and mixers	●			
Cappers	●	●	●	●
Pasters	●	●		
Refiners	●	●		
Mold tenders	●	●		
Extract maker		●	●	
Processers		●	●	
Spice maker	●		●	

TABLE 113.—PERCENT OF WORKERS EXPOSED TO SPECIFIED MATERIALS HAVING INDICATED TYPE OF HAZARD CONTROL—SPICE, COFFEE, ETC., INDUSTRY

[illegible]

TABLE 114—MAJOR EXPOSURES OF THE CHIEF OCCUPATIONS IN THE LIQUOR AND BEVERAGE INDUSTRY

Number of Workers in Survey.....3408
 Number of Workers Exposed2660
 Percent of Workers Exposed75.0%
 Number of Exposures per Person Exposed.....1.4

Occupation	Alcohols, esters and ethers	Aldehydes	Organic dust	Other gases	Alkalies
Number of workers exposed.....	2033	385	330	287	198
Percent of workers exposed.....	59.6	11.3	9.7	8.5	5.8
Still men.....	•••••	•••••		•	
Conveyor hands.....	•••••	•••••			
Cel-o-seal cappers.....	•••••	•••••			
Bottlers.....	•••••	•••••			•••••
Washers.....	•••••	•••••			•••••
Laborers.....	•••••	•••••	•	•	•••••
Machine operators.....	•••••	•••••	•	•	•••••
Brewers.....	•••••	•••••	•••••	•	•••••
Mash and hop men.....	•••••	•••••	•••••	•	•••••
Packers.....	•	•••••	•••••	•	•••••
Vinegar makers.....	•••••	•••••	•••••	•	•••••
Yeast turners.....	•••••	•••••	•••••	•	•••••
Cleaners.....	•••••	•••••	•••••	•	•
Mixer.....	•••••	•••••	•••••	•	
Dyer operators.....	•••••	•••••	•••••	•	
Miller.....	•••••	•••••	•••••	•	
Maintenance men.....	•	•••••	•••••	•	
Mill and cellar men.....	•	•••••	•••••	•	
Unloaders.....	•••••	•••••	•	•	
Fermenters.....	•••••	•••••	•	•	
Labelers.....	•••••	•••••	•••••	•	
Compounders.....	•••••	•••••	•••••	•	
Rectifiers.....	•••••	•••••	•••••	•	
Chemists.....	•••••	•	•	•	•

TABLE 115—PERCENT OF WORKERS EXPOSED TO SPECIFIED MATERIALS HAVING INDICATED TYPE OF HAZARD CONTROL—LIQUORS AND BEVERAGE INDUSTRY

Materials	Number of ex- posures	Percent of exposed workers having specified control								
		Positive ven- tilation	Negative ven- tilation	Local exhaust	Isola- tion	Wet method	Gas masks	Respi- rators	Pressure helmets	Other
All specified materials.....	3,774		1.4	4.7	8.0	0.3	2.4	0.1	0.7	3.8
Alcohols, esters and ether.....	2,033		1.3	0.4	5.3		2.2		0.5	0.5
Aldehydes.....	385			1.8	4.2					32.7
Organic dust.....	330			28.5	1.8			1.2		
Other gases.....	287		3.1	14.6	7.3		15.7			
Alkalies.....	198		4.0		61.5					2.5
Dermatitis.....	77									2.6
Acids, organic.....	55				29.1					
Petroleum.....	55		7.3							
Coal dust, bituminous.....	50				12.0	8.0				
Acids, mineral.....	44									
Silicate dust.....	43					14.0				
Chemicals.....	40									
Fluorides.....	34									
Lead.....	29									
Other metals.....	25			32.0						
Silica dust.....	15			100.0	46.7				100.0	
Sulphur dioxide.....	15									
Lacquer.....	13									
Organic solvents.....	12									
Carbon monoxide.....	9			44.5						
Paint.....	6									
Chlorine.....	4									
Sulphur.....	4									
Dye.....	3		100.0							
Infection.....	3									
Ink.....	3									
Coal tar products.....	1									
Other salts.....	1				100.0					

IRON AND STEEL, MACHINERY AND
VEHICLE INDUSTRIES

Iron and Steel, Machinery and Vehicle Industries

The iron and steel industries were represented by 97,879 workers in 759 plants. These workers were in the following classifications: Agricultural implements; auto factories and accessories; auto repair shops; blast furnaces; car and railroad shops; ship and boat building; carriages and wagons; foundries; machine shops; small machinery and implements; heavy machinery and miscellaneous industries. The largest number of workers surveyed were in the heavy machinery and small machinery industries. Of the 97,879 workers, 66.1 per cent were exposed, and each exposed worker averaged 2.1 exposures to specified materials. The major exposures of these industries were "other metals", dermatitis producers, silicate and silica dusts. It was found that 45 of the 49 specified materials, used to record exposures, occurred in these industries. Table 116 reveals the number and per cent of workers exposed to specified materials. Table 117 reveals the number and percentage of total exposures to specified materials, or, in other words, distribution of each exposure. This table indicates that the chief exposure to "other metals" occurred in the heavy machinery industry; the chief exposure to dermatitis producers occurred in the small machinery and heavy machinery industries; and the chief exposure to silicate and silica dusts occurred in foundries. Table 118 reveals the extent to which control measures have been applied. Local exhaust ventilation was found to be the most prevalent type of control measure.

Agricultural Implement Industry: The agricultural implement industry was represented by 14,434 workers in 15 plants. Of these 14,434 workers, 67.6 per cent were exposed, and each exposed worker averaged 2.1 exposures to specified materials. The major exposures were "other metals" and dermatitis producers. It was found that 35 of the 49 specified materials, used to record exposures, occurred in this industry. Table 119 reveals the major exposures of the chief occupations in this industry. Table 120 reveals the extent to which control measures have been applied. Local exhaust ventilation was found to be the most prevalent type of control measure in this industry.

Auto Factories and Accessories: The auto factory and accessory industry was represented by 10,600 workers in 51 plants. Of these 10,600 workers, 66.1 per cent were exposed, and each exposed worker averaged 2.1 exposures to specified materials. The major exposures were "other metals", carbon monoxide, dermatitis producers and silicate dust. It was found that 34 of the 49 specified materials, used to record exposures, occurred in this industry. Table 121 reveals the major exposures of the chief occupations in this industry. Table 122 reveals the extent to which control measures have been applied. Local exhaust ventilation and negative general ventilation were found to be the most prevalent types of control measures in this industry.

Auto Repair Industry: The auto repair industry was represented by 733 workers in 36 plants. Of these 733 workers, 88.8 per cent were exposed, and each exposed worker averaged 2.4 exposures to specified materials. The major exposures were carbon monoxide, petroleum, organic solvents and "other metals". It was found that 21 of the 49 specified materials, used to record exposures, occurred in this industry. Table 123 reveals the major exposures of the chief occupations in this industry. Table 124 reveals the extent to which control measures have been applied. Negative general ventilation and local

exhaust ventilation were found to be the most prevalent types of control measures in this industry.

Blast Furnace Industry: The blast furnace industry was represented by 8,385 workers in 8 plants. Of these 8,385 workers, 45.0 per cent were exposed, and each exposed worker averaged 1.9 exposures to specified materials. The major exposures were "other metals", other gases, carbon monoxide and alkalies. It was found that 31 of the 49 specified materials, used to record exposures, occurred in this industry. Table 125 reveals the major exposures of the chief occupations in this industry. Table 126 reveals the extent to which control measures have been applied. Local exhaust ventilation was found to be the most prevalent type of control measure in this industry.

Car and Railroad Shop Industry: The car and railroad shop industry was represented by 4,763 workers in 12 plants. Of these 4,763 workers, 56.2 per cent were exposed, and each exposed worker averaged 1.9 exposures to specified materials. The major exposures were petroleum, "other metals" and lead. It was found that 36 of the 49 specified materials, used to record exposures, occurred in this industry. Table 127 reveals the major exposures of the chief occupations in this industry. Table 128 reveals the extent to which control measures have been applied. Respirators, local and negative general ventilation were found to be the most prevalent types of control measures in this industry.

Ship and Boat Building Industry: The ship and boat building industry was represented by 79 workers in 4 plants. This was not deemed a sufficient sample to warrant an analysis of the industry.

Carriages and Wagons Industry: The carriages and wagon industry was represented by 417 workers in 6 plants. Of these 417 workers, 54.2 per cent were exposed, and each exposed worker averaged 1.7 exposures to specified materials. The major exposures were "other metals" and organic dust. It was found that 18 of the 49 specified materials, used to record exposures, occurred in this industry. Table 129 reveals the major exposures of the chief occupations in this industry. Table 130 reveals the extent to which control measures have been applied. Local exhaust ventilation was found to be the most prevalent type of control measure in this industry.

Foundry Industry: The foundry industry was represented by 10,521 workers in 65 plants. Of these 10,521 workers, 88.0 per cent were exposed, and each exposed worker averaged 2.6 exposures to specified materials. The major exposures were silicate and silica dusts, and "other metals". It was found that 29 of the 49 specified materials, used to record exposures, occurred in this industry. Table 131 reveals the major exposures of the chief occupations in this industry. Table 132 reveals the extent to which control measures have been applied. Local exhaust ventilation was found to be the most prevalent type of control measure in this industry.

Machine Shop Industry: The machine shop industry was represented by 991 workers in 62 plants. Of these 991 workers, 87.0 per cent were exposed, and each exposed worker averaged 1.7 exposures to specified materials. The major exposures were dermatitis producers, "other metals", and petroleum. It was found that 23 of the 49 specified materials, used to record exposures, occurred in this industry. Table 133 reveals the major exposures of the chief occupations in this industry. Table 134 reveals the extent to which control measures have been applied. Local exhaust ventilation and wet methods were found to be the most prevalent types of control measures in this industry.

Small Machinery and Implement Industry: The small machinery and implement industry was represented by 19,508 workers in 247 plants. Of these 19,508 workers, 63.3 per cent were exposed, and each exposed worker averaged 1.9 exposures to specified materials. The major exposures were dermatitis producers, "other metals", and petroleum. It was found that 40 of the 49 specified materials, used to record exposures, occurred in this industry. Table 135 reveals the major exposures of the chief occupations in this industry. Table 136 reveals the extent to which control measures have been applied. Local exhaust ventilation and negative ventilation were found to be the most prevalent types of control measures in this industry.

Heavy Machinery Industry: The heavy machinery industry was represented by 20,470 workers in 176 plants. Of these 20,470 workers, 67.3 per cent were exposed, and each exposed worker averaged 2.1 exposures to specified materials. The major exposures were "other metals", dermatitis producers, silica and silicate dusts. It was found that 38 of the 49 specified materials, used to record exposures, occurred in this industry. Table 137 reveals the major exposures of the chief occupations in this industry. Table 138 reveals the extent to which control measures have been applied. Local exhaust ventilation and negative general ventilation were found to be the most prevalent types of control measures in this industry.

Number and percent of workers exposed

Materials	All iron and steel industries in survey		Automobile factories and accessories		Auto repair shops		Blast furnaces (steel)		Car and railroad shops		Ship and boat building		Carriages and wagons		Foundries		Machine shops		Small machinery, implements, instruments		Heavy machinery		Other	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Total number of workers.....	97,879		14,434		733		8,385		4,763		79		417		10,521		991		19,508		20,470		6,978	
Number of plants.....	759		15		36		8		12		4		6		65		62		247		176		77	
Acids, organic.....	62	2.2	3	1.1	165	1.6	10	0.3	21	0.5					65	0.6	3	0.3	21	0.3	5	0.3	2	0.3
Acids, mineral.....	2143	2.2	163	1.1	165	1.6	530	6.3	118	2.5					65	0.6	3	0.3	536	2.7	375	1.8	169	2.4
Accelerators.....	15																		14	0.1			1	0.1
Aldehydes.....	1621	1.7	457	3.2	139	1.3	16	0.3	33	0.7			3	0.7	227	2.2	5	0.5	288	1.5	329	1.6	124	1.8
Alkalis.....	2639	2.7	124	0.9	277	2.6	775	9.3	262	5.5					94	0.9	2	0.2	551	2.8	270	1.3	205	3.0
Anilines.....	1																							
Amines.....	2																							
Chemicals.....	190		34		8		40	0.5	5						31				43		17		12	
Coal tar products.....	695	0.7	149	1.0	159	1.5	7	0.1	57	1.2					6		1		156	0.8	137	0.7	17	
Cyanides.....	807	0.8	25		73	0.7	6		8						8		20	2.0	361	1.9	203	1.0	103	1.5
Asbestos.....	59				19				21															
Coal dust, bituminous.....	917	0.9	53		12		198	2.3	76	1.6	22	27.9	3	0.7	210	2.0	6	0.6	107	0.6	193	0.9	37	0.5
Coal dust, anthracite.....	3																							
Silica dust.....	12957	13.3	1585	11.0	1107	10.4	133	1.6	165	3.5					6451	61.3	1		1137	5.8	2332	11.4	44	0.6
Silicate dust.....	15791	16.2	2054	14.2	1504	14.2	454	5.4	272	5.7	1	1.3	8	1.9	6560	62.3	74	7.5	1066	8.5	2962	14.5	212	3.1
Non-siliceous dust.....	7497	7.7	1235	8.6	713	6.7	39	5.3	154	3.3			3	0.7	1671	15.9	77	7.8	1234	6.3	1977	9.7	374	5.4
Organic dust.....	7004	7.2	730	5.1	1062	10.1	122	1.5	221	4.6	29	36.8	66	15.8	1280	12.2	27	2.7	1411	7.2	1834	9.0	188	2.7
Dye.....	45		6						2						0.5				17		18			
Dermatitis.....	18278	18.7	3583	24.8	1650	15.6	332	4.0	245	5.2			34	8.2	752	7.2	612	61.8	5020	25.8	4798	23.4	1224	17.5
Fluorides.....	529	0.5	2		1		244	2.9	30	0.6					70	0.7			65	0.3	69	0.3	48	0.7
Carbon monoxide.....	8294	8.5	1602	11.1	2088	19.7	803	9.6	162	3.4	2	2.5	38	9.1	712	6.8	41	4.1	537	2.7	1018	5.0	896	12.8
Hydrogen sulphide.....	131						7																	
Sulphur dioxide.....	6894	7.0	1231	8.5	619	5.8	867	10.4	196	4.1	2	2.5	43	10.3	589	5.6	61	6.2	761	3.9	1336	6.5	1093	15.5
Other gases.....	31				12		24		86	1.8									7					
Chlorine.....	4								3										12		3			
Arsenic.....	588	0.6	131	0.9	27		13		29	0.6					21		1		169	0.9	176	0.9	21	
Chromium.....	191				3														122	0.6	49		6	
Calcium.....	270						73	0.9	4						84	0.8			20		78			
Manganese.....	3791	3.8	357	2.5	278	2.6	239	2.9	529	11.1	36	45.7	5	1.2	19	1.9	15	1.5	657	3.3	1113	5.4	245	3.5
Lead.....	2770		6		1		1		6						8				37		201		7	
Antimony.....	21869	22.4	3777	26.2	2169	20.5	148	20.2	593	12.4	4	5.0	74	17.8	3843	36.5	242	24.4	2748	14.1	5592	26.9	1540	22.0
Other metals.....	98		2				8		3										36		37		10	
Nitrogen oxides.....	178				2				105	2.2									66					
Infection.....	1318	1.4	155	1.1	225	2.1			127	2.7									420	2.2	239	1.2	26	
Alcohols, esters and ether.....	417		12		109	1.0			41	0.9									154	0.8				
Halogenated hydrocarbons.....	138						4												74					
Latex.....	964	1.0	46	0.3	51	0.5	13		126	2.6			19	4.6	33		5	0.5	302	1.6	671	3.3	30	
Oil.....	3627	3.7	332	2.3	326	3.1	135	1.6	126	2.6			1		796	7.6	6	0.6	872	4.5	904	4.4	107	1.6
Organic solvents.....	4839	4.9	1012	7.0	673	6.4	208	28.4	85	1.8	8	10.1	43	10.3	261	2.5	60	6.1	1038	5.3	938	4.6	289	3.4
Petroleum.....	7818	8.0	524	3.6	1050	9.9	552	6.6	808	17.0	5	6.3	5	1.2	319	3.0	129	13.0	2216	11.4	1285	6.3	649	9.3
Paint.....	2061	2.2	151	1.1	324	3.1	40	0.5	185	3.9	37	46.9	43	10.3	48	0.5	34	3.4	454	2.3	479	2.3	240	3.5
Phosphorus.....	9																							
Other salts.....	233		11		26		67	0.8	3				1		4				41		82		2	
Sulphur.....	125				16														55		39		1	

*—Denotes less than 1/4 of 1%.

Number and percentage of total exposures to the specified materials

Materials	All iron and steel industries in survey	Automobile and factory accessories		Auto repair shops		Blast furnaces		Car and railroad shops		Ship and boat building		Carriages and wagons		Foundries		Machine shops		Small machinery, implements, instruments		Heavy machinery		Other
		No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	
Total number of workers	97,879	14,434		10,600	733	8,385	4,763	79	417	10,521	991	19,508	20,470	6,978								
Number of exposures	135,347	19,573		14,894	1,560	7,178	4,966	146	394	24,407	1,424	23,438	29,435	7,902								
Acids, organic	62	3	4.8																			3.2
Acids, mineral	2,143	163	7.6	165	7.7	19	0.9	530	24.6	118	5.5											7.9
Accelerators	15																					6.7
Aldehydes	1,621	457	28.2	139	8.6	16	1.0	33	2.0													7.5
Alkalies	2,639	124	4.7	277	10.5	79	3.0	262	9.9													7.7
Amines	1	1	100.0																			
Chemicals	190	34	17.9	8	4.2	40	21.1	5	2.6													6.3
Coal tar products	695	149	21.4	159	22.0	7	1.0	57	8.1													2.5
Cyanides	907	25	3.1	73	9.0	6	0.7	21	35.6													12.8
Asbestos	59																					
Coal dust, bituminous	917	53	5.8	12	1.4	198	21.6	76	8.3	22	2.4	3	0.3	210	22.9	6	0.7	107	11.7	193	21.0	3.9
Coal dust, anthracite	3																					
Silica dust	12,957	186	12.2	1107	8.6	2		765	1.3					6451	49.8	1		1137	8.8	2332	18.0	0.2
Silicate dust	15,791	2054	13.0	1594	9.6	24	0.2	272	1.7	1		8	0.1	6599	41.6	74	0.5	1666	10.6	2362	18.7	1.0
Non-siliceous dust	7,497	1235	16.5	713	9.5	39	0.5	154	2.1	20	0.3	3		1671	22.3	77	1.0	1234	16.5	1977	26.4	4.8
Organic dust	7,004	730	10.4	1062	15.2	34	0.5	122	1.7	221	3.2	66	0.9	1280	18.3	27	0.4	1411	20.2	1854	26.2	2.6
Dye	45	6	13.3					2	4.4			2	4.4					17	37.8	18	40.1	
Dermatitis	18,278	3583	19.6	1650	9.0	28	0.2	332	1.8	34	0.2	34	0.2	752	4.1	612	3.4	3020	27.5	4798	26.2	6.7
Fluorides	8,529	2	0.4	1	0.2	244	46.3	30	5.7					10	13.2	65	12.3	65	12.3	69	13.0	8.9
Carbon monoxide	8,284	1002	19.4	2088	25.2	395	4.8	162	2.0	2		38	0.5	712	8.6	41	0.5	537	6.5	1018	12.3	10.4
Hydrogen sulphide	7																					
Sulphur dioxide	131																					
Other gases	6,894	1231	17.9	619	9.0	96	1.4	867	12.6	24	18.3	43	0.6	589	8.6	61	0.9	761	11.0	1336	19.4	15.6
Chlorine	31																					
Arsenic	4																					
Chromium	588	131	22.3	27	4.6			13	2.2	29	4.9											
Cadmium	191	5	2.6	3	1.6																	
Manganese	270	2	0.7																			
Lead	3,721	357	9.6	278	7.5	54	1.5	239	6.4	36	1.0	5	0.1	194	5.3	15	0.4	451	17.5	1113	30.0	6.5
Antimony	270	6	2.2	1	0.4	6	2.2															
Other metals	21,866	3777	17.3	2169	9.9	148	0.7	563	2.7	4		74	0.3	3843	17.6	242	1.1	2748	12.6	5502	25.4	2.6
Nitrogen oxides	98	2	2.0	2	2.0	4	2.3	3	3.1													
Infection	178																					
Alcohols, esters and ether	1,317	155	11.8	225	17.1	68	5.2	127	9.6													
Halogenated hydrocarbons	1,418	12	2.9	109	26.1	1	0.2	41	9.8													
Ink	138																					
Lacquer	964	46	4.8	51	5.3	68	7.1	13	1.4													
Oil	3,627	332	9.2	326	9.0	22	0.6	135	3.7													
Organic solvents	4,859	1012	20.9	673	13.9	208	4.3	85	1.8													
Petroleum	7,818	524	6.7	1050	13.4	462	3.4	808	10.3	5	0.1	5	0.1	319	4.1	129	1.8	2216	28.3	1295	16.6	8.1
Paint	2,061	151	7.3	324	15.7	26	1.3	185	9.0	37	1.8	43	2.1	48	2.3	34	1.7	454	22.1	479	33.3	1.5
Phosphorus	9																					
Other salts	233	11	4.7	26	11.2																	
Sulphur	125	10	8.0	16	12.8			3	2.4													

Denotes less than 0.1%

TABLE 118.—PERCENT OF WORKERS EXPOSED TO SPECIFIED MATERIALS HAVING INDICATED TYPE OF HAZARD CONTROL—IRON AND STEEL MACHINERY AND VEHICLE INDUSTRY

[illegible]

TABLE 119—MAJOR EXPOSURES OF THE CHIEF OCCUPATIONS IN THE AGRICULTURAL IMPLEMENT INDUSTRY

Number of Workers in Survey.....	14,434
Number of Workers Exposed	9,575
Percent of Workers Exposed.....	67.6%
Number of Exposures per Person Exposed.....	2.1

Occupation	Other metals	Dermatitis producers	Silicate dust	Carbon monoxide	Silica dust	Non-siliceous dust	Other gases	Other organic solvents	Organic dust	Petroleum	Aldehydes	Lead	Oil	Acids, mineral	Halogenated hydrocarbons	Paint	Coal tar products	Chromium	Alkalies
Number of workers exposed..	3777	3583	2054	1602	1585	1235	1231	1012	730	524	457	357	332	163	155	151	149	131	124
Percent of workers exposed..	26.2	24.8	14.2	11.1	11.0	8.6	8.5	7.0	5.1	3.6	3.2	2.5	2.3	1.1	1.1	1.0	1.0	0.9	0.
Machinists (tool makers).....	•	•	•	•						•	•		•						
Welders.....	•						•												
Tumblers.....	•					•													
Cupola men.....			•	•															
Grinders.....	•	•				•													
Sand and shot blasters.....	•				•	•													
Molders.....	•		•		•	•	•												
Blacksmiths.....	•			•		•			•		•								
Platers.....	•																	•	•
Heat treaters (temperers) (annealers).....	•	•				•						•		•					
Crane men.....	•			•		•					•								
Chargers.....	•		•	•	•	•	•												
Laborers.....	•		•	•	•	•	•		•										
Ladle pushers.....	•		•	•	•	•	•		•				•						
Shake-out men.....	•				•	•													
Buffers and polishers (finishers).....	•		•			•													
Fitters.....	•	•				•													
Riveters.....	•																		
Unloaders.....	•						•												
Assemblers.....	•																		
Chippers.....	•	•		•		•		•		•						•			
Furnace and cupola repair- men.....	•		•	•	•	•	•												
Pourers.....	•		•	•	•	•	•												
Utility men.....	•	•	•	•	•	•						•							
Core makers.....	•			•	•	•	•				•		•						
Painters (sprayers) (dippers)	•			•	•	•	•	•				•			•		•	•	
Millwrights.....	•	•	•	•	•	•	•		•	•									
Cutters (burners).....	•						•												
Brazers.....	•						•												
Drill and punch press operators.....	•	•								•				•					
Cleaners and picklers.....	•						•	•						•					•
Sheet metal workers (tinnern).....	•			•		•	•					•		•					
Solderers.....	•											•		•					
Core oven tenders.....			•	•	•							•		•					
Sand cutters and mixers.....			•		•														
Wood mill hands (box makers).....									•	•									
Pattern makers.....									•	•									
Carpenters.....		•							•	•									
Yard men.....			•	•					•	•									
Screw machine operators.....		•		•									•						
Milling machine operators.....		•											•						
Pipe fitters.....		•					•								•				
Testers.....				•															
Machine operators.....					•			•		•									
Fuel tank men.....				•				•		•									
Drivers.....				•				•		•									
Oilers.....										•									
Hammer men (forgers) (bulldozer men).....	•			•							•								

TABLE 120—PERCENT OF WORKERS EXPOSED TO SPECIFIED MATERIALS HAVING INDICATED TYPE OF HAZARD CONTROL—AGRICULTURAL IMPLEMENT INDUSTRY

[illegible]

TABLE 121—MAJOR EXPOSURES OF THE CHIEF OCCUPATIONS IN THE AUTOMOTIVE ACCESSORIES MANUFACTURING INDUSTRY

Number of Workers in Survey.....10,600
 Number of Workers Exposed 7,001
 Percent of Workers Exposed 66.1%
 Number of Exposures per Person Exposed..... 2.1

Occupation	Other metals	Carbon monoxide	Dermatitis producers	Silicate dust	Silica dust	Organic dust	Petroleum	Non-siliceous dust	Other organic solvents	Other gases	Oil	Paint	Lead	Alkalies	Alcohols, esters and ethers	Acids, mineral	Coal products	Aldehydes	Halogenated hydrocarbons
Number of workers exposed	2169	2088	1650	1504	1107	1062	1050	713	673	619	326	324	278	277	225	165	159	139	109
Percent of workers exposed	20.5	19.7	15.6	14.2	10.4	10.1	9.9	6.7	6.3	5.8	3.1	3.1	2.6	2.6	2.1	1.6	1.5	1.3	1.0
Blacksmiths.....	•	•	•	•			•	•		•			•						
Machinists (tool makers).....	•	•	•	•			•	•		•			•						
Welders.....	•	•	•	•			•	•		•			•						
Core makers.....				•						•	•								
Grinders.....	•	•	•	•	•		•	•		•	•		•						
Laborers.....	•	•	•	•	•	•	•	•		•	•		•						
Drill and punch press men.....	•	•	•	•	•	•	•	•		•	•		•					•	
Platers.....	•	•	•	•							•					•			
Buffers and polishers (finishers).....	•	•	•	•						•				•		•			
Body builders.....	•	•	•	•	•	•	•	•					•						
Mechanics.....	•	•	•	•	•		•	•	•				•						
Chippers.....	•	•	•	•	•								•						
Painters (sprayers) (dippers).....	•	•	•	•	•		•	•	•	•		•	•		•		•		•
Wheel and shaft formers.....	•	•	•	•	•					•	•				•				
Sand and shot blasters.....	•	•	•	•	•					•	•								
Foremen.....	•	•	•	•	•		•	•		•	•								
Maintenance men.....	•	•	•	•	•			•		•	•								
Cupola men.....	•	•	•	•	•			•		•	•								
Chargers.....	•	•	•	•	•	•		•		•	•								
Molders.....	•	•	•	•	•	•		•		•	•								
Shovelers.....	•	•	•	•	•					•	•								
Pourers.....	•	•	•	•	•					•	•								
Crane men.....	•	•	•	•	•					•	•								
Truckers.....	•	•	•	•	•					•	•								
Shake-out men.....	•	•	•	•	•					•	•								
Washers (picklers).....	•	•	•	•	•					•	•			•	•	•			•
Aligners.....	•	•	•	•	•					•	•				•	•			•
Cleaners (sweepers).....	•	•	•	•	•					•	•				•	•	•		•
Inspectors.....	•	•	•	•	•					•	•								
Assemblers.....	•	•	•	•	•	•	•	•			•		•	•					
Filers.....	•	•	•	•	•					•	•								
Solderers.....	•	•	•	•	•					•	•		•	•		•			
Radiator machine operators.....	•	•	•	•	•					•	•		•	•		•			
Unloaders and loaders.....	•	•	•	•	•					•	•		•	•		•		•	
Paint mixers.....	•	•	•	•	•					•	•		•	•					
Heat treaters (oven tender) (hardeners).....	•	•	•	•	•					•	•		•	•				•	
Sand mixers.....	•	•	•	•	•					•	•		•	•				•	
Sanders.....	•	•	•	•	•	•				•	•		•	•					
Wood worker (crate makers).....	•	•	•	•	•	•		•		•	•		•	•					
Shippers.....	•	•	•	•	•	•				•	•		•	•					
Paper box men.....	•	•	•	•	•	•				•	•		•	•					
Carpenters.....	•	•	•	•	•	•				•	•		•	•					
Fabric cutters.....	•	•	•	•	•	•				•	•		•	•					
Press men.....	•	•	•	•	•	•				•	•		•	•					
Testers.....	•	•	•	•	•	•				•	•		•	•					
Sheet metal workers (tinsmiths).....	•	•	•	•	•	•				•	•		•	•					

TABLE 122--PERCENT OF WORKERS EXPOSED TO SPECIFIED MATERIALS HAVING INDICATED TYPE OF HAZARD CONTROL--AUTOMOTIVE ACCESSORIES MANUFACTURING INDUSTRY

[illegible]

TABLE 123—MAJOR EXPOSURES OF THE CHIEF OCCUPATIONS IN THE AUTOMOTIVE REPAIRING INDUSTRY

Number of Workers in Survey.....	783
Number of Workers Exposed	650
Percent of Workers Exposed	88.8%
Number of Exposures per Person Exposed.....	2.4

Occupation	Carbon monoxide	Petroleum	Other organic solvents	Other metals	Other gases	Alkalies	Alcohols, esters and ethers	Lacquers	Lead
Number of workers exposed.....	395	266	208	148	96	79	68	63	54
Percent of workers exposed.....	53.8	36.4	28.4	20.2	13.1	10.8	9.3	9.3	7.4
Washers.....	●	●	●			●			
Mechanics (service men).....	●	●	●	●	●			●	●
Painters (sprayers).....	●		●				●	●	●
Sheet metal men.....	●		●	●	●				●
Frame men.....	●			●	●				●
Helpers.....	●			●	●				
Blacksmiths.....	●	●	●				●	●	
Greasers.....	●	●	●	●	●				
Brake men.....	●	●							
Ignition men.....	●								
Tune-up men.....	●	●							
Simonizers.....	●								
Battery men.....	●								
Welders.....	●			●	●				●
Body and fender men.....	●			●	●				●
Foremen.....	●	●	●				●	●	
Gas and oil men.....		●	●						

TABLE 124.—PERCENT OF WORKERS EXPOSED TO SPECIFIED MATERIALS HAVING INDICATED TYPE OF HAZARD CONTROL—AUTOMOTIVE REPAIR INDUSTRY

[illegible]

TABLE 125—MAJOR EXPOSURES OF THE CHIEF OCCUPATIONS IN THE BLAST FURNACE AND STEEL INDUSTRY

Number of Workers in Survey.....8885
 Number of Workers Exposed3759
 Percent of Workers Exposed45.0%
 Number of Exposures per Person Exposed1.9

Occupation	Other metals	Other gases	Carbon monoxide	Alkalies	Petroleum	Acids, mineral	Silicate dust	Dermatitis producers	Fluorides	Lead	Bituminous coal dust	Non-siliceous dust	Oil	Silica dust
Number of workers exposed.....	1226	867	803	775	552	530	454	332	244	239	198	154	135	133
Percent of workers exposed.....	14.6	10.4	9.6	9.3	6.6	6.3	5.4	4.0	2.9	2.9	2.3	1.8	1.6	1.6
Picklers (dippers) (cleaners).....	•			•		•••								
Wipers.....	•			•		•••								
Chemists.....	•			•		•••								
Crane men.....	•	••	••	••		•••								
Galvanizers and drossers.....	•	••	••	••		•••	•		••	•	•			
Platers.....	•	••	••	••		•••			••					
Feeders.....	•	••	••	••		•••			••					
Inspectors.....	•	••	••	••		•••			••					
Annealers (heat treaters) (furnace men) (heater).....	•	••	••	••	•	•••	•			•	•			
Unreelers.....	•	••	••	••		•••			••					
Reelers.....	•	••	••	••		•••			••					
Rougher (rollers).....	•	••	••	••	••	•••			••					
Wire drawers.....	•	••	••	••	••	•••		•					•	
Repair men (millwrights).....	•	••	••	••	••	•••								
Helpers.....	•	••	••	••	••	•••			•					
Laborers.....	•	••	••	••		•	••			•	••	•		•
Locomotive engineers.....	•	••	••	••		•	••				••			
Firemen.....	•	••	••	••		•	••				••			
Gas producer chargers.....	•	••	••	••		•	••				••			
Gas producer operators (gas maker).....	•	••	••	••		•	••				••			
Masons (bricklayers).....	•	••	••	••		•	••				••			•
Grinders.....	•	••	••	••		•	••				••			
Ash men (cinder men).....	•	••	••	••		•	••	•			••			
Yard men.....	•	••	••	••		•	••				••			
Floor stackers.....	•	••	••	••	•	•	••		•		••			
Blacksmith.....	•	••	••	••		•	••				••			
Ladle men.....	•	••	••	••		•	••				••			•
Charging machine operator.....	•	••	••	••		•	••				••			
Bottom makers.....	•	••	••	••		•	••				••			
Pushers.....	•	••	••	••		•	••				••			
Welders.....	•	••	••	••		•	••				••			
Door men.....	•	••	••	••		•	••				••			
Pipe fitters.....	•	••	••	••		•	••	••		••			•	
Painters.....	•	••	••	••		•	••			••				
Melters (furnace men).....	•	••	••	••	•	•	••			••				
Oilers.....	•	••	••	••	•	•	••							
Transfer men.....	•	••	••	••		•	••							
Shear men.....	•	••	••	••		•	••							
Pit men.....	•	••	••	••		•	••	••						
Machine operators.....	•	••	••	••		•	••	••						

TABLE 128—PERCENT OF WORKERS EXPOSED TO SPECIFIED MATERIALS HAVING INDICATED TYPE OF HAZARD CONTROL—CAR AND RAILROAD SHOP INDUSTRY

Materials	Number of exposures	Percent of exposed workers having specified control								
		Positive ventilation	Negative ventilation	Local exhaust	Isolation	Wet method	Gas masks	Respirators	Pressure helmets	Other
All specified materials...	4,966		6.3	6.7	0.3	1.8		8.0	1.1	4.3
Petroleum...	808		1.2	0.9				3.1	0.1	8.3
Other metals...	593		1.3	3.4				9.3	1.7	3.4
Lead...	524		10.2	1.3				15.7	1.0	1.7
Organic solvents...	274		4.4	2.2	0.4			3.7	1.5	2.9
Silicate dust...	272		0.7	5.2	1.8	26.1		18.0	0.7	5.9
Alkalies...	262		0.8							7.6
Dermatitis...	245		4.5							
Organic dust...	221			33.0	0.5	1.4		14.0	0.5	
Other gases...	196		3.6	15.8				2.0		
Paint...	185		8.7	4.9				26.0	3.2	4.9
Silica dust...	165			10.3	0.6	3.0		6.1	5.4	
Carbon monoxide...	162		1.9	62.4						
Alcohols, esters and ether...	127		36.2	5.5				6.3	3.1	0.8
Lacquer...	126		36.5	5.6				25.4	3.2	3.2
Oil...	126									1.6
Acids, mineral...	118		39.0	5.9						12.7
Infection...	105									
Sulphur dioxide...	86									
Coal dust, bituminous...	76		2.6		6.6	13.2				
Coal tar products...	57		80.8	7.0				14.0		14.0
Halogenated Hydrocarbons...	41									
Aldehydes...	33			9.1				75.7	12.1	12.1
Fluorides...	30									
Chromium...	29							13.8		
Acids, organic...	21									38.0
Asbestos...	21			9.5	9.5					
Non-siliceous dust...	20			55.0						
Cyanide...	8								50.0	87.5
Antimony...	6			16.7						66.8
Chemicals...	5									
Manganese...	4							100.0		100.0
Chlorine...	4			25.0						
Arsenic...	3									10.3
Nitrogen oxides...	3			66.7						
Sulphur...	3									100.0
Dye...	2			50.0						

TABLE 129—MAJOR EXPOSURES OF THE CHIEF OCCUPATIONS IN THE WAGON AND TRAILER INDUSTRY

Number of Workers in Survey..... 417
 Number of Workers Exposed..... 226
 Percent of Workers Exposed..... 54.2%
 Number of Exposures per Person Exposed..... 1.7

Occupation	Other metals	Organic dust	Other gases	Other organic solvents	Paint	Carbon monoxide	Dermatitis producers	Lacquers
Number of workers exposed.....	74	66	43	43	43	38	34	19
Percent of workers exposed.....	17.8	15.8	10.3	10.3	10.3	9.1	8.2	4.6
Wood workers.....		•						
Assemblers.....	•	•		•	•			
Pattern makers.....		•		•				
Mill hands.....		•						
Machinists (lathe hands).....	•						•	
Wheel finishers.....			•		•		•	
Heat treaters.....			•			•		
Welders.....	•		•					
Maintenance men.....	•		•					
Grinders.....	•		•					
Forge men.....	•		•			•		
Blacksmiths.....	•		•			•		
Metal workers.....	•			•				
Painters (sprayers).....				•	•			•
Lacquer and paint mixers.....				•	•			•

TABLE 130—PERCENT OF WORKERS EXPOSED TO SPECIFIED MATERIALS HAVING INDICATED TYPE OF HAZARD CONTROL—WAGON AND TRAILER INDUSTRY

Materials	Number of exposures	Percent of exposed workers having specified control								Other
		Positive ventilation	Negative ventilation	Local exhaust	Isolation	Wet method	Gas masks	Respirators	Pressure helmets	
All specified materials.....	394		8.1	36.8				2.0		1.0
Other metals.....	74		1.4	4.0						
Organic dust.....	66			85.0						
Gas.....	43			81.4						
Organic solvents.....	43		32.6	7.0				2.3		
Paint.....	43		30.3	7.0				4.7		4.7
Carbon monoxide.....	38			92.2						
Dermatitis.....	34									
Lacquer.....	19			5.3						10.5
Silicate dust.....	8									
Lead.....	5			100.0				40.0		
Petroleum.....	5									
Aldehydes.....	3									
Coal dust bituminous.....	3									
Non-siliceous dust.....	3		33.3	66.7				33.3		
Alcohols, esters and ether.....	3			66.7						
Dye.....	2		50.0					50.0		
Oil.....	1		100.0							
Sulphur.....	1		100.0					100.0		

TABLE 131--MAJOR EXPOSURES OF THE CHIEF OCCUPATIONS IN THE FOUNDRY INDUSTRY

Number of Workers in Survey.....	10,521
Number of Workers Exposed	9,265
Percent of Workers Exposed	88.0%
Number of Exposures per Person Exposed	2.6

Occupation	Silicate dust	Silica dust	Other metals	Non-siliceous dust	Organic dust	Oil	Dermatitis producers	Carbon monoxide	Other gases	Petroleum	Other organic solvents	Aldehydes	Bituminous coal dust	Lead
Number of workers exposed.....	6560	6451	3843	1671	1280	796	752	712	589	319	261	227	210	199
Percent of workers exposed.....	62.3	61.3	36.5	25.9	12.2	7.6	7.2	6.8	5.6	3.0	2.5	2.2	2.0	1.9
Core makers and helpers.....	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Molders and helpers.....	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Laborers.....	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Machinists.....	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Grinders (roughers) (finishers).....	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Chippers.....	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Foremen.....	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Crane operators.....	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Sand cutters (sand mixers).....	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Dumpers (hook men) (haulers).....	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Chain men.....	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Welders (burners).....	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Inspectors.....	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Assemblers.....	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Shake-out men.....	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Sand and shot blasters (tumblers).....	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Oven men (furnace men).....	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Cupola chargers.....	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Pattern makers.....	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Tool makers.....	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Maintenance men (mechanics).....	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Annealers (heat treaters).....	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Wood machine operators (carpenters).....	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Blacksmiths.....	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Millwrights.....	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Painters (sprayers).....	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Pourers.....	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Tinners (galvanizer).....	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Hammer men.....	•	•	•	•	•	•	•	•	•	•	•	•	•	•

TABLE 132--PERCENT OF WORKERS EXPOSED TO SPECIFIED MATERIALS HAVING INDICATED TYPE OF HAZARD CONTROL--FOUNDRY INDUSTRY

Materials	Number of exposures	Percent of exposed workers having specified control								
		Positive ventilation	Negative ventilation	Local exhaust	Isolation	Wet method	Gas masks	Respirators	Pressure helmets	Other
All specified materials...	24,407	3.5	3.9	13.5	0.5	2.0	-----	5.8	0.4	0.2
Silicate dust.....	6,560	3.1	3.1	7.2	0.5	2.5	-----	8.0	0.4	-----
Silica dust.....	6,451	2.8	3.2	4.7	0.8	2.6	-----	7.1	0.7	-----
Other metals.....	3,843	2.1	5.8	15.8	1.1	2.2	-----	5.4	0.7	0.1
Non-siliceous dust.....	1,671	0.8	5.1	20.3	-----	2.1	-----	5.6	-----	-----
Organic dust.....	1,280	9.2	6.7	29.4	0.2	0.1	-----	7.3	-----	-----
Oil.....	796	4.9	7.5	0.9	-----	-----	-----	-----	-----	-----
Dermatitis.....	752	6.4	-----	-----	-----	-----	-----	-----	-----	-----
Carbon monoxide.....	712	6.9	2.2	62.0	-----	-----	-----	-----	-----	-----
Other gases.....	589	8.3	1.7	63.3	-----	-----	-----	-----	-----	0.3
Petroleum.....	319	1.3	0.9	1.3	-----	-----	-----	0.3	-----	-----
Organic solvents.....	261	0.8	1.9	2.3	-----	-----	-----	0.4	-----	1.1
Aldehydes.....	227	16.3	11.5	91.7	-----	-----	-----	-----	-----	-----
Coal dust bituminous.....	210	-----	-----	1.4	-----	8.1	-----	-----	-----	-----
Lead.....	199	6.0	2.5	22.1	-----	5.5	-----	0.5	-----	-----
Alkalies.....	94	-----	3.2	11.7	-----	-----	-----	-----	-----	8.5
Manganese.....	84	-----	-----	46.4	-----	13.1	-----	-----	-----	-----
Fluorides.....	70	-----	8.6	7.1	-----	-----	-----	-----	-----	-----
Acids, mineral.....	65	6.2	7.7	23.1	-----	-----	-----	-----	-----	15.4
Alcohols, esters and ether.....	54	3.7	-----	29.6	-----	-----	-----	-----	-----	5.6
Paint.....	48	-----	10.4	-----	-----	-----	-----	10.4	-----	18.7
Lacquer.....	33	6.1	9.1	54.5	-----	-----	-----	-----	-----	15.1
Chemicals.....	31	-----	9.7	9.7	-----	-----	-----	-----	-----	-----
Chromium.....	21	-----	-----	-----	-----	-----	-----	-----	-----	-----
Cyanide.....	8	12.5	-----	75.0	-----	-----	-----	-----	-----	25.0
Antimony.....	8	-----	-----	-----	-----	-----	-----	-----	-----	-----
Coal tar products.....	6	33.3	-----	33.3	-----	-----	-----	-----	-----	-----
Cadmium.....	6	-----	-----	-----	-----	-----	-----	-----	-----	16.7
Halogenated Hydrocarbons.....	5	-----	-----	-----	-----	-----	-----	-----	-----	-----
Other salts.....	4	-----	50.0	-----	-----	-----	-----	-----	-----	-----

TABLE 133—MAJOR EXPOSURES OF THE CHIEF OCCUPATIONS IN THE MACHINE SHOP INDUSTRY

Number of Workers in Survey.....	991
Number of Workers Exposed	863
Percent of Workers Exposed	87.0%
Number of Exposures per Person Exposed.....	1.7

Occupation	Dermatitis producers	Other metals	Petroleum	Non-siliceous dust	Silicate dust	Other gases	Other organic solvents
Number of workers exposed	612	242	129	77	74	61	60
Percent of workers exposed	61.8	24.4	13.0	7.8	7.5	6.2	6.1
Machinists and helpers	●●●●●	●	●●●●●	●	●	●	
Punch press operators	●●●●●	●	●●●●●	●	●	●	●
Die and tool makers	●●●●●	●	●●●●●	●	●	●	●
Assemblers	●●●●●	●	●●●●●	●	●	●	●
Helpers	●●●●●	●	●●●●●	●	●	●	●
Mechanics	●●●●●	●	●●●●●	●	●	●	●
Drill press men	●●●●●	●	●●●●●	●	●	●	●
Grinders	●●●●●	●	●●●●●	●	●	●	●
Pattern makers	●●●●●	●	●●●●●	●	●	●	●
Lathe hands	●●●●●	●	●●●●●	●	●	●	●
Milling machine operators	●●●●●	●	●●●●●	●	●	●	●
Screw machine operators	●●●●●	●	●●●●●	●	●	●	●
Pipe threaders	●●●●●	●	●●●●●	●	●	●	●
Welders	●●●●●	●	●●●●●	●	●	●	●
Heat treater	●●●●●	●	●●●●●	●	●	●	●
Blacksmiths	●●●●●	●	●●●●●	●	●	●	●
Cutters	●●●●●	●	●●●●●	●	●	●	●

TABLE 134—PERCENT OF WORKERS EXPOSED TO SPECIFIED MATERIALS HAVING INDICATED TYPE OF HAZARD CONTROL—MACHINE SHOP INDUSTRY

Materials	Number of exposures	Percent of exposed workers having specified control								Other
		Positive ventilation	Negative ventilation	Local exhaust	Isolation	Wet method	Gas masks	Respirators	Pressure helmets	
All specified materials	1,424			8.2		6.7		2.3		1.9
Dermatitis	612									0.5
Other metals	242			17.8		22.4		3.3		5.0
Petroleum	129									
Non-siliceous dust	77			13.0		39.0				
Silicate dust	74			24.3		14.9		14.9		16.2
Other gases	61			18.0				3.3		
Organic solvents	60			1.7				3.3		
Carbon monoxide	41			48.8				4.9		
Paint	34			2.9				5.9		
Organic dust	27							3.7		
Cyanide	20			55.0						
Lead	15			6.7						
Coal dust bituminous	6									
Oil	6									
Aldehydes	5									
Lacquer	5			20.0				40.0		
Acids, mineral	3									
Alkalies	2							50.0		
Coal tar products	1									
Silica dust	1							100.0		
Chromium	1									
Infection	1									
Alcohols, esters and ether	1							100.0		

TABLE 135 MAJOR EXPOSURES OF THE CHIEF OCCUPATIONS IN THE SMALL MACHINERY AND IMPLEMENT INDUSTRY

Number of Workers in Survey.....19,508
 Number of Workers Exposed.....12,358
 Percent of Workers Exposed.....63.3%
 Number of Exposures per Person Exposed.....1.9

Occupation	Dermatitis producers	Other metals	Petroleum dust	Silicate dust	Organic dust	Non-siliceous dust	Silica dust	Other organic solvents	Oil	Other gases	Lead	Alkalies	Carbon monoxide	Acids, mineral	Paint	Alcohols, esters and ethers	Cyanide	Laquers	Aldehydes
Number of workers exposed.....	5020	2748	2216	1666	1411	1234	1137	1038	872	761	651	551	537	536	454	420	361	302	288
Percent of workers exposed.....	25.8	14.1	11.4	8.5	7.2	6.3	5.8	5.3	4.5	3.9	3.3	2.8	2.7	2.7	2.3	2.2	1.9	1.6	1.5
Machinists (lathe hands) (tool and die makers)	•	•	•	•	•	•		•	•	•	•		•				•		•
Drill and punch press opera- tors (tappers)	•	•	•	•	•	•		•	•	•	•		•						
Assemblers	•	•	•	•	•	•		•	•	•	•			•	•	•		•	
Buffers and polishers	•	•	•	•	•	•		•	•	•	•			•					
Grinders and chippers	•	•	•	•	•	•		•	•	•	•								
Screw machine operators	•	•	•	•	•	•		•	•	•	•								
Milling machine operators	•	•	•	•	•	•		•	•	•	•								
Finishers	•	•	•	•	•	•		•	•	•	•								
Millwrights (mechanics) (set-up men) (main- tenance men)	•	•	•	•	•	•		•	•	•	•				•				
Picklers, cleaners and washers	•	•	•	•	•	•		•	•	•	•					•			
Painters, sprayers, enamelers	•	•	•	•	•	•		•	•	•	•				•	•		•	
Laborers	•	•	•	•	•	•		•	•	•	•								
Bench hands	•	•	•	•	•	•		•	•	•	•						•		•
Machine operators	•	•	•	•	•	•		•	•	•	•								
Rubbers and sanders	•	•	•	•	•	•		•	•	•	•								
Forge men (hammer men)	•	•	•	•	•	•		•	•	•	•								
Heat treaters (annealers) (furnace tenders) (hard- eners)	•	•	•	•	•	•		•	•	•	•						•		•
Apprentices	•	•	•	•	•	•		•	•	•	•								
Sand and shot blasters (tumblers)	•	•	•	•	•	•		•	•	•	•								
Extractors	•	•	•	•	•	•		•	•	•	•								
Welders (brazers) (burners)	•	•	•	•	•	•		•	•	•	•								
Wood workers	•	•	•	•	•	•		•	•	•	•								
Platers, tumblers	•	•	•	•	•	•		•	•	•	•								
Packers, shippers	•	•	•	•	•	•		•	•	•	•								
Threaders	•	•	•	•	•	•		•	•	•	•								
Sheet metal workers (tinners) (galvanizers) (tinsmiths)	•	•	•	•	•	•		•	•	•	•								
Solderers	•	•	•	•	•	•		•	•	•	•								
Rackers	•	•	•	•	•	•		•	•	•	•								
Etchers	•	•	•	•	•	•		•	•	•	•								
Pattern makers	•	•	•	•	•	•		•	•	•	•								
Foremen	•	•	•	•	•	•		•	•	•	•								
Blacksmith	•	•	•	•	•	•		•	•	•	•								
Core makers	•	•	•	•	•	•		•	•	•	•								
Molders	•	•	•	•	•	•		•	•	•	•								
Sand mixers, cutters, etc.	•	•	•	•	•	•		•	•	•	•								
Cupola men (oven men)	•	•	•	•	•	•		•	•	•	•								
Crane men	•	•	•	•	•	•		•	•	•	•								
Filers	•	•	•	•	•	•		•	•	•	•								
Fabricators	•	•	•	•	•	•		•	•	•	•								
Masons	•	•	•	•	•	•		•	•	•	•								
Cupola chargers	•	•	•	•	•	•		•	•	•	•								
Paint mixers	•	•	•	•	•	•		•	•	•	•								
Pourers	•	•	•	•	•	•		•	•	•	•								

TABLE 136—PERCENT OF WORKERS EXPOSED TO SPECIFIED MATERIALS HAVING INDICATED TYPE OF HAZARD CONTROL—SMALL MACHINERY AND IMPLEMENT INDUSTRY

[illegible]

TABLE 137—MAJOR EXPOSURES OF THE CHIEF OCCUPATIONS IN THE HEAVY MACHINERY INDUSTRY

Number of Workers in Survey.....20,470
 Number of Workers Exposed.....13,786
 Percent of Workers Exposed.....67.3%
 Number of Exposures per Person Exposed.....2.1

Occupation	Other metals	Dermatitis	Silicate dust	Silica dust	Non-siliceous dust	Organic dust	Other gases	Petroleum	Lead	Carbon monoxide	Other organic solvents	Oil	Paint	Acids, mineral	Aldehydes	Lacquers	Alkalies	Alcohols, esters and ethers	Cyanide	Antimony
Number of workers exposed.....	5502	4736	2662	2332	1977	1834	1336	1265	1113	1015	938	904	479	375	329	271	270	239	203	201
Percent of workers exposed.....	26.9	23.4	14.5	11.4	9.7	9.0	6.5	6.3	5.5	5.0	4.6	4.4	2.3	1.8	1.6	1.3	1.3	1.2	1.0	1.0
Grinders and chippers.....	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Machinists (lathe hands) (tool and die makers).....	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Drill and punch press operators.....	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Machine hands (gear, screw, boring and milling machine operators).....	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Filers.....	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Brazers, welders, burners.....	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Shot and sand blasters (tumbler).....	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Laborers.....	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Blacksmiths.....	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Assemblers (mounters) (fabricators).....	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Sprayers, dippers, painters.....	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Polishers, buffers, sanders.....	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Cupola men (furnace men) (chargers).....	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Core makers.....	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Molders.....	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Timners (tinsmith) (sheet metal workers).....	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Platers.....	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Shake-out men.....	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Pourers.....	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Heat treaters (annealers) (furnace men) (oven men).....	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Forge men (bulldozers) (hammer men).....	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Foremen.....	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Crane men.....	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Millwrights (mechanics) (maintenance men).....	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Boilermakers.....	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Kettle men (galvanizers).....	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Yard men.....	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Pattern makers.....	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Core setters.....	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Bench hands.....	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Solderers.....	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Sand mixers, cutters.....	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Cleaners, washers.....	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Mechanics (set-up men).....	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Pickers.....	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Craters, packers, shippers.....	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Wood machine operators.....	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Testers.....	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Boiler makers.....	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Electrical workers (winders) (electricians) (assemblers).....	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Coil impregnators.....	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•

TABLE 138.—PERCENT OF WORKERS EXPOSED TO SPECIFIED MATERIALS HAVING INDICATED TYPE OF HAZARD CONTROL—HEAVY MACHINERY INDUSTRY

[illegible]

NON-FERROUS METAL INDUSTRIES

Non-Ferrous Metal Industries

The non-ferrous metal industries were represented by 33,154 workers in 411 plants. These workers were in the following classifications: brass mills; screens and weather strips; clock and watch; copper; gold and silver; jewelry; lead and zinc; tinware and enamelware; aluminum; metal specialties; electroplating and miscellaneous industries. The largest number of workers surveyed were in the tinware and enamelware; lead and zinc; metal specialties; and brass mills, screens and weather strip industries. Of the 33,154 workers surveyed, 62.8 per cent were exposed, and each exposed worker averaged 2.5 exposures to specified materials. The major exposures were "other metals", dermatitis producers and lead. It was found that 45 of the 49 specified materials, used to record exposures, occurred in these industries. Table 139 reveals the number and per cent of workers exposed to specified materials. Table 140 reveals the number and percentage of total exposures to specified materials, or, the distribution of each exposure. This table shows that the chief exposure to "other metals" was in the lead and zinc industry; the chief exposure to dermatitis producers was in the miscellaneous industry; and the chief exposure to lead in the lead and zinc industry. Table 141 reveals the extent to which control measures have been applied in these industries. Local exhaust ventilation was found to be the most prevalent type of control measure.

Brass Mills, Screens and Window Strip Industry: The brass mills, screens and window strip industry was represented by 5,302 workers in 66 plants. Of these 5,302 workers, 66.7 per cent were exposed, and each exposed worker averaged 2.4 exposures to specified materials. The major exposures were "other metals", silica dust, lead, dermatitis producers and silicate dust. It was found that 38 of the 49 specified materials, used to record exposures, occurred in this industry. Table 142 reveals the major exposures of the chief occupations in this industry. Table 143 reveals the extent to which control measures have been applied. Local exhaust ventilation was found to be the most prevalent type of control measure in this industry.

Clock and Watch Industry: The clock and watch industry was represented by 3,471 workers in 7 plants. Of these 3,471 workers, 32.7 were exposed, and each exposed worker averaged 1.8 exposures to specified materials. The major exposure was dermatitis producers. It was found that 31 of the 49 specified materials, used to record exposures, occurred in this industry. Table 144 reveals the major exposures of the chief occupations in this industry. Table 145 reveals the extent to which control measures have been applied. Local exhaust ventilation was found to be the most prevalent type of control measure in this industry.

Copper Industry: The copper industry was represented by 607 workers in 6 plants. Of these 607 workers, 65.7 per cent were exposed, and each exposed worker averaged 2.9 exposures to specified materials. The major exposures were "other metals", lead and antimony. It was found that 19 of the 49 specified materials, used to record exposures, occurred in this industry. Table 146 reveals the major exposures of the chief occupations in this industry. Table 147 reveals the extent to which control measures have been applied. Local exhaust and positive general ventilation and respirators were found to be the most prevalent types of control measures in this industry.

Gold and Silver Industry: The gold and silver industry was represented by 50 workers in 4 plants. This sample was not deemed of sufficient size to make any analyses.

Jewelry Industry: The jewelry industry was represented by 221 workers in 6 plants. Of these 221 workers, 42.1 per cent were exposed, and each exposed worker averaged 2.9 exposures to specified materials. The major exposures

were "other metals", dermatitis producers, silica dust and organic dust. It was found that 23 of the 49 specified materials, used to record exposures, occurred in this industry. Table 148 reveals the major exposures of the chief occupations in this industry. Table 149 reveals the extent to which control measures have been applied. Local exhaust ventilation was found to be the most prevalent type of control measure in this industry.

Lead and Zinc Industry: The lead and zinc industry was represented by 5,291 workers in 57 plants. Of these 5,291 workers, 78.0 per cent were exposed, and each exposed worker averaged 2.7 exposures to specified materials. The major exposures were "other metals", lead, carbon monoxide and gases. It was found that 39 of the 49 specified materials, used to record exposures, occurred in this industry. Table 150 reveals the major exposures of the chief occupations in this industry. Table 151 reveals the extent to which control measures have been applied. Local exhaust ventilation, respirators and negative general ventilation were found to be the most prevalent types of control measures in this industry.

Tinware and Enamelware Industry: The tinware and enamelware industry was represented by 6142 workers in 44 plants. Of these 6142 workers, 58.8 per cent were exposed, and each exposed worker averaged 2.3 exposure to specified materials. The major exposure were "other metals", silicate dust, and lead. It was found that 35 of the 49 specified materials, used to record exposures, occurred in this industry. Table 152 reveals the major exposures of the chief occupations in this industry. Table 153 reveals the extent to which control measures have been applied. Local exhaust ventilation was found to be the most prevalent type of control measure in this industry.

Aluminum Industry: The aluminum industry was represented by 666 workers in 16 plants. Of these 666 workers, 82.3 per cent were exposed, and each exposed worker averaged 2.5 exposures to specified materials. The major exposures were "other metals", silicate dust, silica dust and dermatitis producers. It was found that 25 of the 49 specified materials, used to record exposures, occurred in this industry. Table 154 reveals the major exposures of the chief occupations in this industry. Table 155 reveals the extent to which control measures have been applied. Local exhaust ventilation was found to be the most prevalent type of control measure in this industry.

Metal Specialties and Novelties Industry: The metal specialties and novelties industry was represented by 5267 workers in 80 plants. Of these 5267 workers, 56.2 per cent were exposed, and each exposed worker averaged 2.1 exposures to specified materials. The major exposures were dermatitis producers, "other metals", lead and petroleum. It was found that 38 of the 49 specified materials, used to record exposures, occurred in this industry. Table 156 reveals the major exposures of the chief occupations in this industry. Table 157 reveals the extent to which control measures have been applied. Local exhaust and negative general ventilation were found to be the most prevalent types of control measures in this industry.

Electroplating and Metal Finishing Industry: The electroplating and metal finishing industry was represented by 872 workers in 38 plants. Of these 872 workers, 75.9 per cent were exposed, and each exposed worker averaged 3.8 exposures to specified materials. The major exposures were "other metals", organic dust, dermatitis producers, silicate dust, mineral acids, alkalies, cyanide, chromium and non-siliceous dust. It was found that 30 of the 49 specified materials, used to record exposures, occurred in this industry. Table 158 reveals the major exposures of the chief occupations in this industry. Table 159 reveals the extent to which control measures have been applied. Local exhaust ventilation, negative ventilation and protective clothing were found to be the most prevalent types of control measures in this industry.

TABLE 139—METAL INDUSTRIES (EXCEPT IRON AND STEEL)—EXPOSURES TO SPECIFIED MATERIALS

Materials	Number and percent of workers exposed											
	All metal industries in survey		Brass mills, screens and weather strips		Clock and watch factories		Copper factories		Gold and silver		Jewelry	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Total number of workers.....	33,154		5,302		3,471		607		50		221	
Number of plants.....	411		66		7		6		4		6	
Acids, organic.....	172	0.5	231	4.4	16	0.5	69	11.4	4	8.0	9	4.1
Acids, mineral.....	2018	6.1	39	0.7	4	0.1	25	4.1	19	38.1	15	6.8
Accelerators.....	2	0.0	1739	5.3	16	0.5	4	0.7	2	4.0	2	0.9
Aldehydes.....	197	0.6	26	0.5	6	0.2	4	0.7	3	6.0	9	4.1
Alkalis.....	137	0.4	203	0.6	14	0.5	4	0.7	3	6.0	9	4.1
Chemicals.....	203	0.6	118	2.2	49	1.4	4	0.7	3	6.0	9	4.1
Coal tar products.....	1007	3.0	43	0.8	10	0.3	12	2.0	2	4.0	2	0.9
Cyanides.....	654	2.0	16	0.3	10	0.3	12	2.0	2	4.0	2	0.9
Asbestos.....	2752	8.3	928	17.5	92	2.7	12	2.0	2	4.0	2	0.9
Coal dust bituminous.....	204	0.6	3	0.0	3	0.1	3	0.5	3	6.0	3	1.4
Coal dust anthracite.....	2752	8.3	928	17.5	92	2.7	12	2.0	2	4.0	2	0.9
Silica dust.....	3183	9.6	804	15.2	111	3.2	13	2.1	7	14.0	7	3.2
Silicate dust.....	2753	8.3	551	10.4	166	4.8	64	10.5	14	28.0	8	3.6
Non-siliceous dust.....	2602	7.9	478	9.0	103	3.0	45	7.4	14	28.0	26	11.8
Organic dust.....	17	0.0	5	0.1	1	0.0	26	4.3	2	4.0	34	15.4
Dye.....	5432	16.4	890	16.8	475	13.7	79	13.0	1	2.0	4	1.8
Derivatives.....	337	1.0	23	0.4	6	0.2	79	13.0	1	2.0	4	1.8
Carbon monoxide.....	2011	6.1	303	5.7	6	0.2	79	13.0	1	2.0	4	1.8
Hydrogen sulphide.....	9	0.0	2	0.0	1	0.0	55	9.1	1	2.0	2	0.9
Sulphur dioxide.....	482	1.5	374	7.1	11	0.3	82	13.5	1	2.0	2	0.9
Other gases.....	2343	7.1	12	0.0	6	0.2	55	9.1	1	2.0	2	0.9
Chlorine.....	266	0.8	15	0.3	8	0.2	82	13.5	1	2.0	2	0.9
Arsenic.....	1029	3.1	141	2.7	8	0.2	22	3.7	4	8.0	4	1.8
Chromium.....	1044	3.2	16	0.3	2	0.0	8	1.3	4	8.0	4	1.8
Cadmium.....	168	0.5	10	0.2	1	0.0	8	1.3	2	4.0	2	0.9
Mercury.....	4624	13.9	894	16.8	128	3.7	158	26.0	31	62.0	52	23.8
Manganese.....	615	1.9	20	0.4	9	0.3	149	24.5	2	4.0	4	1.8
Lead.....	135	0.4	157	2.9	143	4.1	250	41.2	31	62.0	52	23.8
Selenium.....	8107	24.4	217	4.1	9	0.3	8	1.3	2	4.0	4	1.8
Other metals.....	333	1.0	54	1.0	9	0.3	8	1.3	2	4.0	4	1.8
Nitrogen oxides.....	1	0.0	33	0.6	98	2.8	8	1.3	8	16.0	22	10.0
Infection.....	634	1.9	53	1.0	27	0.8	8	1.3	2	4.0	2	0.9
Alcohols, esters and ethers.....	313	0.9	53	1.0	17	0.5	8	1.3	2	4.0	2	0.9
Halogenated hydrocarbons.....	243	0.7	11	0.2	27	0.8	8	1.3	2	4.0	2	0.9
Ink.....	535	1.6	37	0.7	78	2.2	8	1.3	3	6.0	19	8.6
Lacquer.....	739	2.2	215	4.1	32	0.9	8	1.3	3	6.0	19	8.6
Oil.....	1337	4.0	91	1.7	146	4.2	87	14.3	8	16.0	14	6.3
Organic solvents.....	2161	6.5	463	8.7	119	3.4	15	2.5	8	16.0	14	6.3
Petroleum.....	341	1.0	21	0.4	65	1.9	23	3.8	1	2.0	1	0.5
Paint.....	14	0.0	14	0.3	14	0.4	10	1.7	1	2.0	1	0.5
Phosphorus.....	250	0.8	7	0.1	1	0.0	1	0.2	3	6.0	3	1.4
Other salts.....	201	0.6	6	0.1	1	0.0	1	0.2	3	6.0	3	1.4
Sulphur.....												

*—Denotes less than 1/2 of 1%

TABLE 140—METAL INDUSTRIES (EXCEPT IRON AND STEEL)—EXPOSURES TO SPECIFIED MATERIALS

Materials	Number and percentage of total exposures to the specified materials															
	Brass mills, screens and weather strips		Clock and watch factories		Copper factories		Gold and silver		Jewelry		Lead and zinc		Tinware, enamel-ware		Aluminum	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
All metal industries in survey	33,154		5,302		3,471		607		50		221		6,142		666	
Total number of workers.....	51,610		8,564		2,021		1,157		128		267		8,338		1,357	
Total number of exposures.....																
Acids, organic.....	172				16	9.3					108	62.8	7	4.1		
Acids, mineral.....	2,018		231	11.5	62	3.1			4	0.2	257	12.7	314	15.6	4	0.2
Accelerators.....	2	100.0							9	0.5						
Aldehydes.....	197		39	19.8	4	2.1			1	0.5	41	20.8	25	12.7	1	0.5
Alkalies.....	1,739		178	10.3	16	0.9	25	1.4	19	1.1	115	6.6	307	21.1	27	1.8
Chemicals.....	1,137		26	19.0	6	4.4	4	2.9	2	1.5	56	40.9	37	9.5	4	2.8
Coal tar products.....	203		5	2.5	14	6.8			3	1.5	20	69	34.0	2	1.0	
Cyanides.....	1,007		118	11.7	49	4.8			9	0.9	21	2.0	69	27.3	2	1.0
Asbestos.....	43								2	0.2						
Coal dust bituminous.....	654		16	2.4	10	1.5			2	0.3	547	83.7	30	23.2	4	0.6
Coal dust anthracite.....	204		3	1.5							201	98.5	30	4.6		
Silica dust.....	2,752		928	33.7	92	3.3	12	0.4	2	0.1	134	4.9	379	13.8	153	5.6
Sulfate dust.....	3,183		804	25.2	111	3.5	13	0.4	7	0.2	284	8.9	1091	34.3	231	7.3
Non-siliceous dust.....	2,753		551	20.0	166	6.0	64	2.3	8	0.3	214	7.8	502	18.3	51	1.9
Organic dust.....	2,602		478	18.4	103	4.0	45	1.7	14	0.5	356	13.7	109	4.2	105	4.0
Dye.....	17		5	29.4	1	5.9			26	1.0						
Dermatitis.....	5,432		890	16.2	475	8.8	26	0.5	34	0.6	566	10.4	494	9.1	137	2.5
Fluorides.....	337		23	6.8	1	0.3			4	1.2	8	2.4	188	58.8	14	4.2
Carbon monoxide.....	2,011		303	15.1	6	0.3	79	3.9	1	0.1	1056	52.5	201	10.0	81	4.0
Sulphur dioxide.....	9		2	22.2							7	77.8				
Other gases.....	482		374	15.9	11	0.5	82	3.5	2	0.1	422	87.5	309	13.2	87	3.7
Chlorine.....	12				6	50.0			5	41.7						
Arsenic.....	266		15	5.6							5	5				
Chromium.....	1,029		141	13.7	8	0.8			4	0.4	222	83.4	169	16.4	125	12.2
Cadmium.....	1,044		16	1.5	2	0.2					562	53.8	160	15.3	43	4.1
Mercury.....	11						8	72.8							2	18.2
Manganese.....	168		10	6.0							1	1.1	156	92.9	1	0.2
Lead.....	4,624		894	19.4	128	2.6	158	3.4	1893	41.0	676	14.6	1	1.1	1	0.2
Antimony.....	615		20	3.2			149	24.2	346	56.3	7	1.1	135	100.0	1	0.2
Selenium.....	135															
Other metals.....	8,107		1517	18.7	143	1.8	250	3.1	2063	25.3	253	10.0	1272	15.7	386	4.8
Nitrogen oxides.....	333		24	7.2	9	2.7			4	1.2	45	1	7	2.1		
Infection.....	634		33	5.1	108	15.5	8	1.3	22	3.6	21	3.3	57	9.0	3	0.5
Alcohols, esters and ethers.....	213		55	16.0	27	8.4			2	0.5	15	4.8	9	2.9	1	0.3
Halogenated hydrocarbons.....	243		1	4.5	27	11.1			1	0.4	106	43.6	50	20.6	8	1.5
Ink.....	535		37	6.9	78	14.6	8	1.5	19	3.6	2	0.4	70	13.1		
Lacquer.....	739		215	29.1	32	4.3			2	0.3	37	3.7	161	21.8	4	0.5
Oil.....	1,537		91	5.9	146	9.5	87	3.7	161	10.5	52	47.2	30.7	17.0	15	1.0
Organic solvents.....	2,161		463	21.4	119	5.5	15	0.7	253	11.7	515	23.8	8	0.4	420	19.4
Petroleum.....	341		21	6.2	65	19.1			1	0.3	10	2.9	98	28.2	2	0.6
Phosphorus.....	14															
Other salts.....	260		7	2.8							12	4.8	182	72.8	27	10.8
Sulphur.....	201		6	3.0							128	63.7	9	1.5		
Electroplating.....																
Metal specialties and novelties.....																
Aluminum.....																
Tinware, enamel-ware.....																
Lead and zinc.....																
Jewelry.....																
Copper factories.....																
Gold and silver.....																
Brass mills, screens and weather strips.....																
Clock and watch factories.....																
Copper factories.....																
Gold and silver.....																
Jewelry.....																
Lead and zinc.....																
Tinware, enamel-ware.....																
Aluminum.....																
Metal specialties and novelties.....																
Electroplating.....																
Other.....																

* Denotes less than 0.1%

TABLE 141--PERCENT OF WORKERS EXPOSED TO SPECIFIED MATERIALS HAVING INDICATED TYPE OF HAZARD CONTROL--METAL INDUSTRIES (EXCEPT IRON AND STEEL)

Materials	Number of ex- posures	Percent of exposed workers having specified control								
		Positive ven- tilation	Negative ven- tilation	Local exhaust	Isola- tion	Wet method	Gas masks	Respi- rators	Pressure helmets	Other
All specified materials	51,610	2.5	7.7	31.6	1.6	2.7	0.1	4.8	0.2	6.1
Other metals	8,107	2.5	7.6	34.8	2.2	6.1		6.2	0.1	5.7
Dermatitis	5,432		2.9	1.1	0.2	0.5				8.3
Lead	4,624	1.3	9.9	28.3	1.0	1.6	0.2	10.7		5.4
Silicate dust	3,183	3.0	11.8	28.4	0.5	11.1		8.2	0.2	1.9
Non-siliceous dust	2,753	2.8	6.0	49.2	0.3	7.3		7.0		1.4
Silica dust	2,752	1.7	9.3	46.8	2.2	3.2		8.6	0.4	1.1
Organic dust	2,602	2.7	4.7	62.3	2.4	0.9		6.4		0.1
Other gases	2,343	4.4	13.8	46.0	0.9		0.3	1.8	0.3	1.4
Petroleum	2,161	3.6	4.0	3.3						1.3
Acids, minerals	2,018	3.7	8.6	28.2	3.4	0.3	0.7	0.7		21.9
Carbon monoxide	2,011	5.0	14.5	55.5	0.7			3.1		1.7
Alkalies	1,739	2.4	7.2	16.9	2.8	1.0		2.1		21.3
Organic solvents	1,537	1.6	4.8	32.4	0.7	0.7		1.6		3.1
Cadmium	1,044	2.5	4.9	21.6	3.0	2.3		1.2		11.3
Chromium	1,029	3.5	2.1	72.1	3.1	0.7		1.7		35.0
Cyanide	1,007	6.8	9.7	13.6	3.4	0.6				22.9
Oil	739	6.1	8.4	9.5				0.7		4.1
Coal dust bituminous	654		21.1	16.2	0.3	2.9		0.9		
Alcohols, esters and ether	634	3.2	5.7	46.7	1.1			3.5		4.3
Antimony	615	2.0	6.2	26.8	2.1	0.7		19.8		7.8
Lacquer	535	1.9	5.0	60.2	1.3			7.7		3.0
Sulphur dioxide	482	2.5	0.8	42.8	12.0		4.4	6.8	8.3	0.8
Paint	341	0.6	1.2	47.0				8.5	1.8	3.5
Fluorides	337	1.8	3.9	22.6		4.8		3.9		10.1
Nitrogen oxides	333		18.3	59.5	11.4		2.7	3.9		3.6
Halogenated hydro- carbons	313	3.8	11.2	30.0	26.6	1.9				4.8
Arsenic	266		12.8	10.9		4.5	3.0	3.4		2.3
Other salts	250	0.8	0.4	15.6		0.4		0.4		2.4
Ink	243	4.1	6.6							0.4
Coal dust anthracite	204		0.5	52.0		1.5		2.9		
Coal tar products	203	5.9	5.4	68.0	1.5	0.5		18.2		4.4
Sulphur	201		14.4	7.0		7.5		2.0		9.9
Aldehydes	197	1.0	6.6	58.0	2.0	2.0				2.0
Acids, organic	172	1.7	5.2	20.4				43.2		1.7
Manganese	168		0.6	18.5		1.2		4.8		5.4
Chemicals	137	8.0	16.1							
Selenium	135			7.4						
Asbestos	43			9.3		2.3		7.0		
Dye	17			11.8				11.8		
Phosphorus	14			14.3						
Chlorine	12									
Mercury	11		27.3							
Hydrogen sulphide	9	22.2	11.1	100.0				33.3	44.4	
Accelerators	2			100.0						
Infection	1									

TABLE 142—MAJOR EXPOSURES OF THE CHIEF OCCUPATIONS IN THE BRASS INDUSTRY

Number of Workers in Survey.....	5302
Number of Workers Exposed.....	3543
Percent of Workers Exposed.....	66.7%
Number of Exposures per Person Exposed.....	2.4

Occupation	Other metals	Silica dust	Lead	Dermatitis producers	Silicate dust	Non-siliceous dust	Organic dust	Petroleum	Other gases	Carbon monoxide	Acids, mineral	Oil	Alkalies	Chromium	Cyanides
Number of workers exposed.....	1517	928	894	890	804	551	478	463	374	303	231	215	178	141	118
Percent of workers exposed.....	28.6	17.5	16.8	16.8	15.2	10.4	9.0	8.7	7.1	5.7	4.4	4.1	3.4	2.7	2.2
Molders.....	•	•	•	•	•	•	•			•					
Laborers.....	•	•	•	•	•	•	•			•					
Furnace men (cupola men) (melters).....	•	•	•	•	•	•	•		•	•					
Pourers.....	•	•	•	•	•	•	•			•					
Grinders and chippers.....	•	•	•	•	•	•	•			•					
Platers.....	•	•	•	•	•	•	•			•					
Core makers.....	•	•	•	•	•	•	•			•					
Millwrights (mechanics) (maintenance men).....	•	•	•	•	•	•	•			•					
Inspectors.....	•	•	•	•	•	•	•			•					
Solderers.....	•	•	•	•	•	•	•			•					
Machine hands (lathe, milling, shearing, tapping, etc. operators).....	•	•	•	•	•	•	•			•					
Burners and welders.....	•	•	•	•	•	•	•			•					
Machinists (tool and die makers).....	•	•	•	•	•	•	•			•					
Buffers and polishers.....	•	•	•	•	•	•	•			•					
Annealers (heat treaters).....	•	•	•	•	•	•	•			•					
Hammer men.....	•	•	•	•	•	•	•			•					
Chargers.....	•	•	•	•	•	•	•			•					
Assemblers.....	•	•	•	•	•	•	•			•					
Bench hands.....	•	•	•	•	•	•	•			•					
Foremen.....	•	•	•	•	•	•	•			•					
Crane men.....	•	•	•	•	•	•	•			•					
Sand and shot blasters (tumblers).....	•	•	•	•	•	•	•			•					
Shake-out men.....	•	•	•	•	•	•	•			•					
Sand mixers, cutters.....	•	•	•	•	•	•	•			•					
Pattern makers.....	•	•	•	•	•	•	•			•					
Picklers, cleaners.....	•	•	•	•	•	•	•			•					
Rackers.....	•	•	•	•	•	•	•			•					
Bright dippers.....	•	•	•	•	•	•	•			•					
Box and crate makers.....	•	•	•	•	•	•	•			•					
Tinners (sheet metal workers).....	•	•	•	•	•	•	•			•					

TABLE 143—PERCENT OF WORKERS EXPOSED TO SPECIFIED MATERIALS HAVING INDICATED TYPE OF HAZARD CONTROL—BRASS INDUSTRY

Materials	Number of exposures	Percent of exposed workers having specified control								
		Positive ven-tilation	Negative ven-tilation	Local exhaust	Isola-tion	Wet method	Gas masks	Respi-rators	Pressure helmets	Other
All specified materials	8,564	4.8	8.4	29.6	0.9	1.0		2.1		5.4
Other metals	1,517	2.9	10.5	40.0	0.9	1.5		3.6		6.5
Silica dust	928	4.2	12.5	23.3	3.2	2.7		2.6		
Lead	894	2.3	10.4	38.6				4.3		8.9
Dermatitis	890		2.8							13.8
Silicate dust	804	6.1	14.1	11.2	0.1	3.5		2.6		
Non-siliceous dust	551	9.1	11.2	56.5				1.3		
Organic dust	478	7.5	5.9	47.2				6.3		
Petroleum	463			6.1						0.9
Other gases	374	0.8	8.1	49.0	0.8					
Carbon monoxide	303	1.3	7.6	63.0						1.3
Acids, mineral	231	4.3	3.0	28.6	11.7					26.0
Oil	215	20.0	15.8							5.6
Alkalies	178	4.5	2.3	32.6	1.2			1.2		14.6
Chromium	141	25.6		36.9						11.3
Cyanide	118	33.8	3.4	22.8						18.6
Organic solvents	91			5.5						
Halogenated hydrocarbons	53		1.9	56.8				5.4		
Aldehydes	39		18.0	61.5						
Lacquer	37			56.8				5.4		
Alcohols, esters and ether	33			51.5						
Chemicals	26	30.8	11.6							
Nitrogen oxides	24		16.7	98.9						4.2
Fluorides	23			21.7						4.4
Paint	21	9.5		9.5				14.3		
Antimony	20			30.0						
Coal dust bituminous	16					37.5				
Cadmium	16			50.0						
Arsenic	15		38.7	6.7						
Phosphorus	14			14.3						
Ink	11	91.0	9.1							
Manganese	10		10.0	100.0						90.0
Other salts	7	28.3		57.3						28.3
Sulphur	6			33.3						
Coal tar products	5				60.0					20.0
Dye	5									
Coal dust anthracite	3		33.3							
Accelerators	2	100.0								
Hydrogen sulphide	2	100.0		100.0						

TABLE 146—MAJOR EXPOSURES OF THE CHIEF OCCUPATIONS IN THE COPPER
MANUFACTURING INDUSTRY

Number of Workers in Survey.....	607
Number of Workers Exposed.....	399
Percent of Workers Exposed.....	65.7%
Number of Exposures per Person Exposed.....	2.9

Occupation	Other metals	Lead	Antimony	Other organic solvents	Other gases	Carbon monoxide	Acids, mineral	Non-siliceous dust	Sulphur dioxide	Organic dust
Number of workers exposed	250	158	149	87	82	79	69	64	55	45
Percent of workers exposed	41.2	26.0	24.5	14.3	13.5	13.0	11.4	10.5	9.1	7.4
Coppersmiths	●	●			●	●	●	●		●
Tinners (galvanizers) (sheet metal workers)	●	●					●			
Strippers	●						●			
Laborers	●	●	●		●	●	●		●	
Crane men							●			
Grinders	●							●		
Machinists						●		●		
Buffers and polishers	●							●		
Furnace men (smelters)	●	●	●		●	●		●	●	●
Machine operators (punch press, etc.)	●			●	●	●				
Annealers (heat treaters)	●					●				
Welders	●	●	●		●					
Sorters	●									
Bailers	●	●	●							
Enamellers and coaters				●						

TABLE 147—PERCENT OF WORKERS EXPOSED TO SPECIFIED MATERIALS HAVING INDICATED TYPE OF HAZARD CONTROL—COPPER MANUFACTURING INDUSTRY

[illegible]

TABLE 148—MAJOR EXPOSURES OF THE CHIEF OCCUPATIONS IN THE JEWELRY INDUSTRY

Number of Workers in Survey.....	221
Number of Workers Exposed.....	98
Percent of Workers Exposed.....	42.1%
Number of Exposures per Person Exposed.....	2.9

Occupation	Other metals	Dermatitis producers	Silica dust	Organic dust	Alcohols, esters and ethers	Lacquers	Alkalies	Other organic solvents	Acids, mineral	Cyanides
Number of workers exposed.	52	34	27	26	22	19	15	14	9	9
Percent of workers exposed.	23.8	15.4	12.2	11.8	10.0	8.6	6.8	6.3	4.1	4.1
Platers.	•				•	•	•		•	•
Polishers and buffers.	•	•	•	•						
Dippers, enamelers, sprayers.	•				•	•		•		
Tool and die makers.		•								
Helpers.		•								
Welders.	•									
Assemblers.	•									
Solderers.	•									
Finishers.					•	•		•		

TABLE 149—PERCENT OF WORKERS EXPOSED TO SPECIFIED MATERIALS HAVING INDICATED TYPE OF HAZARD CONTROL—JEWELRY INDUSTRY

[illegible]

TABLE 150—MAJOR EXPOSURES OF THE CHIEF OCCUPATIONS IN THE LEAD AND ZINC INDUSTRY

Number of Workers in Survey.....	5291
Number of Workers Exposed.....	4130
Percent of Workers Exposed.....	78.0%
Number of Exposures per Person Exposed.....	2.7

Occupation	Other metals	Lead	Carbon monoxide	Other gases	Dermatitis producers	Cadmium	Bituminous coal dust	Sulphur dioxide	Organic dust	Antimony	Silicate dust	Acids, mineral	Petroleum	Arsenic	Non-siliceous dust	Anthracite coal dust
Number of workers exposed	2063	1893	1056	995	566	562	547	422	356	346	284	257	253	222	214	201
Percent of workers exposed	39.1	35.9	20.0	18.8	10.7	10.6	10.4	8.0	6.7	6.6	5.4	4.9	4.8	4.2	4.1	3.8
Laborers	•	•	•	•		•	•	•	•	•		•		•	•	•
Pourers	•	•	•	•								•		•	•	
Burners, welders	•	•	•	•				•				•		•		
Track men	•	•	•	•			•		•	•		•		•		
Blacksmiths	•	•	•	•												
Repairmen	•	•	•	•								•	•			
Galvanizers (tanners) (kettle men)	•	•	•	•			•				•	•	•			
Casters	•	•	•	•		•				•			•			
Smelters and refiners (melters) (roasters) (hearth tenders) (hegeler operators)	•	•	•	•		•	•	•		•	•					
Bag house men	•	•	•	•				•		•						
Mixers	•	•	•	•		•	•		•		•					•
Chargers	•	•	•	•		•	•		•					•		•
Cleaners	•	•	•	•		•			•			•				
Oxide men	•	•	•	•		•		•								
Residue men	•	•	•	•												
Masons	•	•	•	•							•	•				
Crusher dumpers	•	•	•	•							•	•				
Extrusion pressmen	•	•	•	•		•	•				•	•				
Mill men	•	•	•	•							•	•				
Zinc sulphate men	•	•	•	•								•				
Grinders and crushers	•	•	•	•					•		•				•	
Tool and die makers (machinists)	•	•	•	•									•			
Maintenance men	•	•	•	•									•			
Sinter men	•	•	•	•				•	•				•			•
Ore men	•	•	•	•					•				•			
Drawers	•	•	•	•								•			•	
Roughers and slab rollers	•	•	•	•										•		
Slitters and trimmers	•	•	•	•											•	
Cottrell operator	•	•	•	•										•		
Chemists	•	•	•	•												
Acid still operators	•	•	•	•		•		•				•				
Helpers	•	•	•	•			•		•	•	•	•				
Firemen (furnace tenders)	•	•	•	•				•	•							•
Finishers	•	•	•	•							•					
Die washers	•	•	•	•									•			
Foremen	•	•	•	•				•								
Cadmium separators	•	•	•	•		•										
Loaders and unloaders	•	•	•	•							•					

TABLE 151—PERCENT OF WORKERS EXPOSED TO SPECIFIED MATERIALS HAVING INDICATED TYPE OF HAZARD CONTROL—LEAD AND ZINC INDUSTRY

[illegible]

TABLE 152—MAJOR EXPOSURES OF THE CHIEF OCCUPATIONS IN THE TINWARE AND ENAMELWARE INDUSTRY

Number of Workers in Survey.....6142
 Number of Workers Exposed.....3607
 Percent of Workers Exposed.....58.8%
 Number of Exposures per Person Exposed.....2.3

Occupation	Other metals	Silicate dust	Lead	Petroleum	Non-siliceous dust	Dermatitis producers	Other organic solvents	Silica dust	Alkalies	Acids, mineral	Other gases	Carbon monoxide	Fluorides	Salts	Chromium	Oil	Cadmium	Manganese	Selenium
Number of workers exposed...	1272	1091	676	515	502	494	472	379	367	314	309	201	198	182	169	161	160	156	135
Percent of workers exposed....	20.8	17.8	11.0	8.4	8.2	8.1	7.7	6.2	6.0	5.1	5.0	3.3	3.2	3.0	2.8	2.6	2.6	2.5	2.2
Platers.....	•								•	•					•		•		
Assemblers.....	•	•		•	•	•				•					•		•		
Brushers.....	•	•	•		•			•					•		•		•		
Dippers, sprayers, enamelers.....	•	•	•		•			•			•		•		•		•		
Shot and sand blasters.....	•	•				•		•				•	•		•				
Welders.....	•	•						•					•		•				
Sweepers.....	•	•			•			•	•		•		•		•		•	•	•
Smelters.....	•	•	•					•	•				•		•		•		
Foremen.....	•	•						•	•	•			•		•				
Galvanizers (dippers) (tanners) (sheet metal workers).....	•		•	•						•		•		•					
Millmen (grinders) (mixers) (millers).....	•	•	•		•			•	•		•		•		•		•		•
Grainers.....	•	•	•				•		•										
Polishers and buffers.....	•	•	•		•	•		•											
Grinders and sanders.....	•	•	•		•			•											
Laborers.....	•	•	•		•				•	•	•	•				•			
Machinists (tool and die makers).....	•	•		•	•	•	•								•	•			
Maintenance men (mill- wrights).....	•	•	•	•	•	•	•	•					•						
Frit makers.....	•	•	•		•	•		•	•	•	•	•	•		•				
Oven men (kiln men).....	•	•	•		•	•		•		•	•	•	•						
Annealer (heat treaters).....	•	•	•	•				•		•	•	•	•		•		•	•	
Dryer men (burners).....	•	•	•					•		•	•	•			•		•	•	•
Sagger men.....	•	•	•					•	•				•						
Ceramic engineer (ceramists).....	•	•	•		•			•		•			•						
Cleaners.....	•	•	•		•			•	•	•	•								
Draw press operators.....	•	•	•			•		•			•			•					
Strainers, beaters, spongers.....	•	•	•		•			•	•				•	•	•				
Unloaders and loaders.....	•	•	•		•			•	•				•	•	•				•
Slip room hands.....	•	•	•					•	•				•	•	•				•
Glazers.....	•	•	•		•			•					•		•		•		
Machine hands (punching, stamping, etc.).....	•	•		•		•	•			•					•	•			
Picklers (dippers).....			•						•	•		•		•					
Solderers.....			•						•	•									
Casters.....	•	•			•			•	•	•									
Inspectors.....	•	•		•	•			•	•				•						
Can and cap forming machine operators.....			•						•		•								

TABLE 153—PERCENT OF WORKERS EXPOSED TO SPECIFIED MATERIALS HAVING INDICATED TYPE OF HAZARD CONTROL—TINWARE AND ENAMELWARE INDUSTRY

Materials	Number of exposures	Percent of exposed workers having specified control								
		Positive ventilation	Negative ventilation	Local exhaust	Isolation	Wet method	Gas masks	Respirators	Pressure helmets	Other
All specified materials	8,338	2.3	8.0	33.6	0.8	5.8	-----	8.8	0.4	4.2
Other metals	1,272	2.1	11.9	40.6	1.4	13.3	-----	9.3	0.6	3.7
Silicate dust	1,091	2.5	13.9	39.2	0.5	17.2	-----	18.1	0.6	2.7
Lead	676	4.0	14.8	48.9	-----	7.9	-----	4.3	-----	5.2
Petroleum	515	-----	-----	2.3	-----	-----	-----	-----	-----	0.6
Non-siliceous dust	502	-----	8.2	27.8	0.6	3.2	-----	20.9	-----	3.0
Dermatitis	494	-----	-----	-----	-----	-----	-----	-----	-----	17.6
Organic solvents	472	2.8	2.3	57.2	-----	0.2	-----	1.2	-----	2.9
Silica dust	379	1.8	12.4	37.2	2.4	7.9	-----	44.3	2.6	0.3
Alkalies	367	2.5	5.0	15.0	1.1	2.7	-----	9.3	-----	8.5
Acids, mineral	314	1.3	3.2	60.4	-----	-----	-----	-----	-----	10.8
Other gases	309	6.5	14.6	57.9	2.9	-----	-----	-----	2.3	-----
Carbon monoxide	201	9.5	22.4	69.6	4.5	-----	-----	-----	-----	-----
Fluorides	198	3.0	3.0	12.7	-----	8.1	-----	6.6	-----	-----
Other salts	182	-----	-----	10.4	-----	0.5	-----	6.5	-----	6.9
Chromium	169	-----	-----	19.5	-----	-----	-----	-----	-----	6.8
Oil	161	1.2	-----	42.8	-----	-----	-----	-----	-----	2.5
Cadmium	160	-----	-----	11.9	-----	-----	-----	-----	-----	-----
Manganese	156	-----	-----	13.5	-----	1.3	-----	5.1	-----	-----
Selenium	135	-----	-----	7.4	-----	-----	-----	-----	-----	-----
Organic dust	109	1.8	7.3	40.4	5.5	-----	-----	3.6	-----	11.5
Paint	96	-----	-----	48.0	-----	-----	-----	12.5	-----	-----
Lacquer	70	2.9	2.9	37.2	-----	-----	-----	5.8	-----	-----
Coal tar products	69	14.5	14.5	69.5	-----	-----	-----	26.1	-----	4.3
Alcohols, esters and ether	57	19.3	19.3	29.8	-----	-----	-----	3.5	-----	7.0
Ink	50	-----	4.0	-----	-----	-----	-----	-----	-----	2.0
Coal dust bituminous	30	-----	-----	-----	-----	-----	-----	-----	-----	-----
Aldehydes	25	8.0	-----	12.0	-----	-----	-----	-----	-----	-----
Cyanide	23	-----	-----	26.1	-----	-----	-----	-----	-----	17.4
Chemicals	13	23.1	38.4	-----	-----	-----	-----	-----	-----	-----
Asbestos	10	-----	-----	30.0	-----	-----	-----	-----	-----	-----
Halogenated hydrocarbons	9	-----	-----	33.3	-----	-----	-----	-----	-----	11.1
Antimony	7	-----	-----	42.9	-----	-----	-----	42.9	-----	-----
Acids, organic	7	42.9	42.9	-----	-----	-----	-----	-----	-----	28.6
Nitrogen oxides	7	-----	-----	-----	-----	-----	-----	-----	-----	-----
Sulphur	3	-----	-----	100.0	-----	-----	-----	100.0	-----	-----

TABLE 154—MAJOR EXPOSURES OF THE CHIEF OCCUPATIONS IN THE ALUMINUM INDUSTRY

Number of Workers in Survey.....	666
Number of Workers Exposed.....	548
Percent of Workers Exposed.....	82.3%
Number of Exposures per Person Exposed.....	2.5

Occupation	Other metals	Silicate dust	Silica dust	Dermatitis producers	Organic dust	Other gases	Carbon monoxide	Non-siliceous dust
Number of workers exposed.....	386	231	153	137	105	87	81	51
Percent of workers exposed.....	58.0	34.7	23.0	20.6	15.8	13.1	12.6	7.7
Sand belt operators.....	●		●					●
Laborers.....	●	●	●		●	●	●	●
Molders.....	●	●	●		●	●	●	●
Grinders and chippers.....	●	●	●	●				●
Polishers and buffers.....	●	●	●		●			●
Furnace tenders (melters) (open hearth operators).....	●	●	●			●	●	
Welders.....	●					●		
Saw operators.....	●					●		
Core makers.....	●	●	●				●	
Foremen.....	●	●	●			●	●	
Die casters.....	●						●	
Trimmers.....	●							
Pattern makers.....	●				●			●
Foundry men (shake-out, pour, mix, etc).....	●	●	●				●	●
Maintenance men.....	●	●	●			●	●	
Tool and die makers.....	●			●		●		
Machine operators.....	●			●		●		

TABLE 155—PERCENT OF WORKERS EXPOSED TO SPECIFIED MATERIALS HAVING INDICATED TYPE OF HAZARD CONTROL—ALUMINUM INDUSTRY

Materials	Number of exposures	Percent of exposed workers having specified control								
		Positive ventilation	Negative ventilation	Local exhaust	Isolation	Wet method	Gas masks	Respirators	Pressure helmets	Other
All specified materials.....	1,357	5.6	7.2	29.8	-----	1.1	-----	1.1	-----	2.0
Other metals.....	386	8.8	10.1	20.7	-----	1.6	-----	1.0	-----	
Silicate dust.....	231	-----	2.2	37.7	-----	3.9	-----	1.7	-----	
Silica dust.....	153	-----	3.3	11.1	-----		-----	1.3	-----	
Dermatitis.....	137	-----			-----		-----		-----	
Organic dust.....	105	-----		73.3	-----		-----		-----	
Other gases.....	87	24.2	25.1	63.6	-----		-----		-----	
Carbon monoxide.....	81	25.9	26.1	71.6	-----		-----		-----	
Non-siliceous dust.....	51	-----	7.8	23.5	-----		-----		-----	
Other salts.....	27	-----			-----		-----		-----	
Alkalies.....	27	-----		3.7	-----		-----		-----	74.0
Organic solvents.....	15	-----		26.7	-----		-----		-----	46.7
Fluorides.....	14	-----		21.4	-----		-----		-----	
Lacquer.....	8	-----		37.5	-----		-----	25.0	-----	
Petroleum.....	8	-----			-----		-----		-----	
Acids, mineral.....	4	-----			-----		-----		-----	
Chemicals.....	4	-----			-----		-----		-----	
Coal dust bituminous.....	4	-----			-----		-----		-----	
Oil.....	4	-----	25.0		-----		-----		-----	
Alcohols, esters and ethers.....	3	-----		100.0	-----		-----	33.3	-----	
Paint.....	2	-----		100.0	-----		-----	100.0	-----	
Coal tar products.....	2	-----		100.0	-----		-----		-----	
Aldehydes.....	1	-----			-----		-----		-----	
Lead.....	1	-----			-----		-----		-----	
Antimony.....	1	-----			-----		-----		-----	
Halogenated hydrocarbons.....	1	-----			-----		-----		-----	

TABLE 156—MAJOR EXPOSURES OF THE CHIEF OCCUPATIONS IN THE METAL SPECIALTIES AND NOVELTIES INDUSTRY

[illegible]

TABLE 157—PERCENT OF WORKERS EXPOSED TO SPECIFIED MATERIALS HAVING INDICATED TYPE OF HAZARD CONTROL—METAL SPECIALTIES AND NOVELTIES INDUSTRY

[illegible]

TABLE 158—MAJOR EXPOSURES OF THE CHIEF OCCUPATIONS IN THE ELECTROPLATING AND METAL FINISHING INDUSTRY

Number of Workers in Survey.....	872
Number of Workers Exposed.....	688
Percent of Workers Exposed.....	75.9%
Number of Exposures per Person Exposed.....	3.8

[illegible]

TABLE 159—PERCENT OF WORKERS EXPOSED TO SPECIFIED MATERIALS HAVING INDICATED TYPE OF HAZARD CONTROL—ELECTROPLATING AND METAL FINISHING INDUSTRY

[illegible]

LEATHER INDUSTRIES

Leather Industries

The leather industries were represented by 10,271 workers in 73 plants. These workers were in the following classifications: saddlery and harness; leather goods; shoes; tanneries; and trunks and suitcase industries. The largest number of workers surveyed were in the shoe and tannery industries. Of the 10,271 workers surveyed, 43.9 per cent were exposed, and each exposed worker averaged 1.8 exposures to specified materials. The major exposures were organic dust, dyes, chromium and infections. It was found that 35 of the 49 specified materials, used to record exposures, occurred in these industries. Table 160 reveals the number and per cent of workers exposed to specified materials. Table 161 reveals the number and percentage of total exposures to specified materials, or the distribution of each exposure. This table shows that the chief exposure to organic dust was in the shoe and tannery industries; the chief exposure to dyes in the shoe and tannery industries; the chief exposure to chromium was in the tannery industry; and the chief exposure to infections was in the tannery industry. Table 162 reveals the extent to which control measures have been applied in these industries. Negative general and local exhaust ventilation and protective clothing were the most prevalent types of control measures in these industries.

Saddlery and Harness Industry: The saddlery and harness industry was represented by 221 workers in 3 plants. Of these 221 workers, 50.3 per cent were exposed, and each exposed worker averaged 1.6 exposures to specified materials. The major exposures were organic dust, oil and dyes. It was found that 12 of the 49 specified materials, used to record exposures, occurred in this industry. Table 163 reveals the major exposures of the chief occupations in this industry. Table 164 reveals the extent to which control measures have been applied. Positive general ventilation was found to be the most prevalent type of control measure in this industry.

Leather Goods Industry: The leather goods industry was represented by 416 workers in 16 plants. Of these 416 workers, 32.0 per cent were exposed, and each exposed worker averaged 1.4 exposures to specified materials. The major exposure was found to be organic dust. It was found that 16 of the 49 specified materials, used to record exposures, occurred in this industry. Table 165 reveals the major exposures of the chief occupations in this industry. Table 166 reveals the extent to which control measures have been applied. Protective clothing and local exhaust ventilation were the only types of control measures in this industry.

Shoe Industry: The shoe industry was represented by 6516 workers in 24 plants. Of these 6516 workers, 33.0 per cent were exposed, and each exposed worker averaged 1.2 exposures to specified materials. The major exposures were found to be organic dust, organic solvents and dyes. It was found that 24 of the 49 specified materials, used to record exposures, occurred in this industry. Table 167 reveals the major exposures of the chief occupations in this industry. Table 168 reveals the extent to which control measures have been applied. Local exhaust and positive general ventilation were found to be the most prevalent types of control measures in this industry.

Tannery Industry: The tannery industry was represented by 2331 workers in 17 plants. Of these 2331 workers, 75.8 per cent were exposed, and each

exposed worker averaged 2.7 exposures to specified materials. The major exposures were found to be infections, chromium, organic dust and dyes. It was found that 32 of the 49 specified materials, used to record exposures, occurred in this industry. Table 169 reveals the major exposures of the chief occupations in this industry. Table 170 reveals the extent to which control measures have been applied. Negative general ventilation and protective clothing were found to be the most prevalent types of control measures in this industry.

Trunk and Suitcase Industry: The trunk and suitcase industry was represented by 787 workers in 13 plants. Of these 787 workers, 45.6 per cent were exposed, and each exposed worker averaged 1.2 exposures to specified materials. The major exposure was organic dust. It was found that 15 of the 49 specified materials, used to record exposures, occurred in this industry. Table 171 reveals the major exposures of the chief occupations in this industry. Table 172 reveals the extent to which control measures have been applied. Local exhaust ventilation was found to be the most prevalent type of control measure in this industry.

TABLE 160—LEATHER INDUSTRIES—EXPOSURES TO SPECIFIED MATERIALS

Materials	Number and percent of workers exposed											
	All leather industries in survey		Saddlery and harness		Leather belts, etc.		Shoes		Tanneries		Trunks and suitcases	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Total number of workers.....	10,271		221		416		6,516		2,331		787	
Number of plants.....	73		3		16		24		17		13	
Acids, organic.....	258	2.5	7	3.2			2	*	249	10.7		
Acids, mineral.....	200	2.0	5	2.3			1	*	194	8.3		
Aldehydes.....	28	*							28	1.2		
Alkalies.....	365	3.6	12	5.4	7	1.7	10	*	328	14.1	8	1.0
Amines.....	37	*							37	1.6		
Chemicals.....	5	*							5	*		
Coal tar products.....	55	0.5					1	*	53	2.3	1	*
Cyanides.....	1	*					1	*				
Coal dust bituminous.....	66	0.6	5	2.3	1	*	23	*	33	1.4	4	0.5
Silica dust.....	2	*							2	*		
Silicate dust.....	155	1.5	3	1.4	1	*	27	*	120	5.2	4	0.5
Non-siliceous dust.....	25	*					20	*	5	*		
Organic dust.....	1763	17.2	40	18.1	100	24.1	829	12.7	492	21.1	302	38.4
Dye.....	756	7.4	26	11.8	6	1.4	286	4.4	436	18.7	2	*
Dermatitis.....	160	1.6			2	0.5	12	*	127	5.5	19	2.4
Carbon monoxide.....	2	*			1	*	1	*				
Hydrogen sulphide.....	57	0.6							57	2.4		
Sulphur dioxide.....	14	*							14	0.6		
Other gases.....	194	1.9			6	1.4	152	2.3	36	1.5		
Chlorine.....	1	*							1	*		
Arsenic.....	160	1.6							160	6.9		
Chromium.....	671	6.5	6	2.7			8	*	652	28.0	5	0.6
Lead.....	50	0.5					16	*	29	1.2	5	0.6
Other metals.....	87	0.9			1	*	17	*	69	3.0		
Infection.....	671	6.5	17	7.7					654	28.0		
Alcohols, esters and ethers.....	267	2.6			13	3.1	183	2.8	61	2.6	10	1.3
Halogenated hydrocarbons.....	29	*					29	0.5				
Ink.....	71	0.7			2	0.5	68	1.0	1	*		
Lacquer.....	226	2.2			11	2.7	56	0.9	151	6.5	8	1.0
Oil.....	470	4.6	30	13.6	12	2.9	136	2.1	288	12.4	4	0.5
Organic solvents.....	575	5.6			17	4.1	509	7.8	18	0.8	31	3.9
Petroleum.....	233	2.3	21	9.5	1	*	110	1.7	97	4.2	4	0.5
Paint.....	23	*					4	*	7	*	12	1.5
Other salts.....	281	2.7	2	0.9	4	1.0			275	11.8		
Sulphur.....	101	1.0							101	4.3		

*—Denotes less than $\frac{1}{2}$ of 1%

TABLE 161—LEATHER INDUSTRIES—EXPOSURES TO SPECIFIED MATERIALS

Materials	All leather industries in survey	Number and percentage of total exposures to the specified materials									
		Saddlery and harness		Leather belts, etc.		Shoes		Tanneries		Trunks, suitcases	
Total number of workers.....	10,271	221		416		6,516		2,331		787	
Total number of exposures.....	8,059	174		185		2,501		4,780		419	
		No.	%	No.	%	No.	%	No.	%	No.	%
Acids, organic.....	258	7	2.7	—	—	2	0.8	249	96.5	—	—
Acids, mineral.....	200	5	2.5	—	—	1	0.5	194	97.0	—	—
Aldehydes.....	28	—	—	—	—	—	—	28	100.0	—	—
Alkalies.....	365	12	3.3	7	1.9	10	2.7	328	89.9	8	2.0
Amines.....	37	—	—	—	—	—	—	37	100.0	—	—
Chemicals.....	5	—	—	—	—	—	—	5	100.0	—	—
Coal tar products.....	55	—	—	—	—	1	1.8	53	96.4	1	1.8
Cyanides.....	1	—	—	—	—	1	100.0	—	—	—	—
Coal dust, bituminous.....	66	5	7.6	1	1.5	23	34.8	33	50.0	4	6.1
Silica dust.....	2	—	—	—	—	—	—	2	100.0	—	—
Silicate dust.....	155	3	1.9	1	0.7	27	17.4	120	77.4	4	2.6
Non-siliceous dust.....	25	—	—	—	—	20	80.0	5	20.0	—	—
Organic dust.....	1,763	40	2.3	100	5.7	829	47.0	492	27.9	302	17.1
Dye.....	756	26	3.5	6	0.8	286	37.8	436	57.6	2	0.3
Dermatitis.....	160	—	—	2	1.3	12	7.5	127	79.4	10	11.8
Carbon monoxide.....	2	—	—	1	50.0	1	50.0	—	—	—	—
Hydrogen sulphide.....	57	—	—	—	—	—	—	57	100.0	—	—
Sulphur dioxide.....	14	—	—	—	—	—	—	14	100.0	—	—
Other gases.....	194	—	—	6	3.1	152	78.3	36	18.6	—	—
Chlorine.....	1	—	—	—	—	—	—	1	100.0	—	—
Arsenic.....	160	—	—	—	—	—	—	160	100.0	—	—
Chromium.....	671	6	0.9	—	—	8	1.2	652	97.1	5	0.8
Lead.....	50	—	—	—	—	16	32.0	29	58.0	5	10.0
Other metals.....	87	—	—	1	1.2	17	19.5	69	79.3	—	—
Infection.....	671	17	2.5	—	—	—	—	654	97.5	—	—
Alcohols, esters and ethers.....	267	—	—	13	4.9	183	68.5	61	22.9	10	3.7
Halogenated Hydrocarbons.....	29	—	—	—	—	29	100.0	—	—	—	—
Ink.....	71	—	—	2	2.8	68	95.8	1	1.4	—	—
Lacquer.....	226	—	—	11	4.9	56	24.8	151	66.8	8	3.5
Oil.....	470	30	6.3	12	2.6	136	28.9	288	61.3	4	0.9
Organic solvents.....	575	—	—	17	3.0	509	88.5	18	3.1	31	5.4
Petroleum.....	233	21	9.1	1	0.4	110	47.2	97	41.6	4	1.7
Paint.....	23	—	—	—	—	4	17.4	7	30.4	12	50.2
Other salts.....	281	2	0.7	4	1.4	—	—	275	97.9	—	—
Sulphur.....	101	—	—	—	—	—	—	101	100.0	—	—

TABLE 162—PERCENT OF WORKERS EXPOSED TO SPECIFIED MATERIALS HAVING INDICATED TYPE OF HAZARD CONTROL—LEATHER INDUSTRIES

[illegible]

TABLE 165—MAJOR EXPOSURES OF THE CHIEF OCCUPATIONS IN THE LEATHER BELTS AND LEATHER GOODS INDUSTRY

Number of Workers in Survey.....	416
Number of Workers Exposed.....	133
Percent of Workers Exposed.....	32.0%
Number of Exposures per Person Exposed.....	1.4

Occupation	Organic dust	Other organic solvents	Alcohols, esters and ethers	Oil	Lacquer
Number of workers exposed.....	100	17	13	12	11
Percent of workers exposed.....	24.1	4.1	3.1	2.9	2.7
Skivers.....	•				
Cutters, splicers.....	•				
Sorters.....	•				
Tackers.....	•				
Riveters.....	•				
Coilers.....	•				
Tanners.....	•			•	
Braiders.....	•				
Rollers.....	•				
Trimmers.....	•				
Sewers.....	•	•			
Buffers.....	•		•		•
Laborers.....	•				
Janitors.....	•				
Belt makers.....	•			•	•
Shellacers.....	•		•		•
Stainer.....	•		•		•
Lacquer men.....	•		•		•

TABLE 166—PERCENT OF WORKERS EXPOSED TO SPECIFIED MATERIALS HAVING INDICATED TYPE OF HAZARD CONTROL—LEATHER BELTS, LEATHER GOODS INDUSTRY

[illegible]

TABLE 167—MAJOR EXPOSURES OF THE CHIEF OCCUPATIONS IN THE SHOE INDUSTRY

Number of Workers in Survey.....	6516
Number of Workers Exposed.....	2149
Percent of Workers Exposed.....	33.0%
Number of Exposures per Person Exposed.....	1.2

Occupation	Organic dust	Other organic solvents	Dyes	Alcohols, esters and ethers	Other gases	Oil	Petroleum	Ink
Number of workers exposed.....	829	509	286	183	152	136	110	68
Percent of workers exposed.....	12.7	7.8	4.4	2.8	2.3	2.1	1.7	1.0
Cutters.....	•		•	•			•	
Rounders.....	•							
Trimmers.....	•							
Burnishers, buffers and polishers.....	•		•	•		•	•	
Lasters.....	•			•				
Shoe makers.....	•	•	•					
Machine operators.....	•							
Roughers and scourers.....	•							
Sanders.....	•			•				
Stainers.....	•	•	•					
Machinists.....	•						•	
Skivers.....	•							
Janitors.....	•							
Dressers.....	•	•	•					
Brushers and sprayers.....	•	•	•	•	•	•	•	
Heel finishers.....	•							
Maintenance men.....	•				•		•	
Packers.....	•					•		
Inspectors.....	•	•		•		•		
Shoe repairers.....	•		•	•		•	•	
Inkers.....	•		•	•			•	•
Bottom painters and finishers.....	•		•	•			•	
Cleaners and treers.....		•	•	•	•			•
Cementers.....		•	•	•	•			
Coverers.....		•		•				
Sole layers.....	•	•		•				
Stitchers and sewers.....		•					•	

TABLE 168—PERCENT OF WORKERS EXPOSED TO SPECIFIED MATERIALS HAVING INDICATED TYPE OF HAZARD CONTROL—SHOE INDUSTRY

Materials	Number of exposures	Percent of exposed workers having specified control								
		Positive ventilation	Negative ventilation	Local exhaust	Isolation	Wet method	Gas masks	Respirators	Pressure helmets	Other
All specified materials.....	2,501	7.9	0.3	21.3	0.0	0.4				1.4
Organic dust.....	822	10.4	3.6	48.8		1.1				
Organic solvents.....	509	4.9	0.6	0.4						1.8
Dye.....	286	13.0		3.5	0.4					5.2
Alcohols, esters and ether.....	183	1.6	0.6	9.3						1.1
Other gases.....	152			2.6						
Oil.....	136	25.0		8.8						3.7
Petroleum.....	110	0.9	0.9	35.5						
Ink.....	68	13.2		1.5						
Lacquer.....	56	5.4		32.2						5.4
Halogenated hydrocarbons.....	29									
Silicate dust.....	27			29.6		3.7				
Coal dust bituminous.....	23									4.3
Dermatitis.....	22									
Non-siliceous dust.....	20			30.0						
Other metals.....	17	5.9		29.4						
Lead.....	16									
Chromium.....	8			100.0						
Alkalies.....	8									
Paint.....	4									
Acids, organic.....	2									
Acids, mineral.....	1									
Coal tar products.....	1									
Cyanide.....	1									
Carbon monoxide.....	1			100.0						

TABLE 171—MAJOR EXPOSURES OF THE CHIEF OCCUPATIONS IN THE TRUNK AND SUITCASE INDUSTRY

Number of Workers in Survey.....	787
Number of Workers Exposed.....	359
Percent of Workers Exposed.....	45.6%
Number of Exposures per Person Exposed.....	1.2

Occupation	Organic dust	Other organic solvents	Dermatitis producers	Paint	Alcohols, esters and ethers	Lacquer	Alkalies
Number of workers exposed	302	31	19	12	10	8	8
Percent of workers exposed	38.4	3.9	2.4	1.5	1.3	1.0	1.0
Gluers.....	•				•	•	•
Liners.....	•	•	•				•
Cutters.....	•						•
Press operators.....	•						
Sewers.....	•						
Trunk and luggage workers.....	•				•	•	
Sanders.....	•						
Wood workers.....	•						
Carpenters.....	•						
Assemblers (finishers).....	•						
Sprayers.....		•		•	•	•	
Stainers.....					•		
Sheet metal workers.....		•		•			

TABLE 172.—PERCENT OF WORKERS EXPOSED TO SPECIFIED MATERIALS HAVING INDICATED TYPE OF HAZARD CONTROL—TRUNK AND SUIT CASE INDUSTRY

[illegible]

LUMBER AND FURNITURE INDUSTRIES

Lumber and Furniture Industries

The lumber and furniture industries were represented by 15,254 workers in 234 plants. These workers were in the following classifications: furniture; caskets; piano and organ; planing and milling; and miscellaneous industries. The largest number of workers surveyed was in the furniture industry. Of the 15,254 workers, 57.6 per cent were exposed, and each exposed worker averaged 1.6 exposures to specified materials. The major exposure was organic dust. It was found that 35 of the 49 specified materials, used to record exposures, occurred in these industries. Table 173 reveals the number and per cent of workers exposed to specified materials. Table 174 reveals the number and percentage of the total exposures to specified materials, or the distribution of each exposure. This table shows that the chief exposure to organic dust was in the furniture industry. Table 175 reveals the extent to which control measures have been applied in these industries. Local exhaust ventilation was found to be the most prevalent type of control measure.

Furniture Industry: The furniture industry was represented by 9008 workers in 106 plants. Of these 9008 workers, 69.0 per cent were exposed, and each exposed worker averaged 1.4 exposures to specified materials. The major exposure was organic dust. It was found that 32 of the 49 specified materials, used to record exposures, occurred in this industry. Table 176 reveals the major exposures of the chief occupations in this industry. Table 177 reveals the extent to which control measures have been applied. Local exhaust ventilation was found to be the most prevalent type of control measure.

Casket Industry: The casket industry was represented by 1032 workers in 16 plants. Of these 1032 workers, 59.1 per cent were exposed, and each exposed worker averaged 1.9 exposures to specified materials. The major exposures were organic dust, lead and "other metals". It was found that 28 of the 49 specified materials, used to record exposures, occurred in this industry. Table 178 reveals the major exposures of the chief occupations in this industry. Table 179 reveals the extent to which control measures have been applied. Local exhaust ventilation was found to be the most prevalent type of control measure.

Piano and Organ Industry: The piano and organ industry was represented by 1733 workers in 11 plants. Of these 1733 workers, 48.6 per cent were exposed, and each exposed worker averaged 1.4 exposures to specified materials. The major exposure was organic dust. It was found that 23 of the 49 specified materials, used to record exposures, occurred in this industry. Table 180 reveals the major exposures of the chief occupations in this industry. Table 181 reveals the extent to which control measures have been applied. Local exhaust ventilation was found to be the most prevalent type of control measure.

Planing and Milling Industry: The planing and milling industry was represented by 341 workers in 10 plants. Of these 341 workers, 60.0 per cent were exposed, and each exposed worker averaged 1.1 exposures to specified materials. The major exposure was organic dust. It was found that 16 of the 49 specified materials, used to record exposures, occurred in this industry. It was found that local exhaust ventilation was the most prevalent type of control measure. No tables of the exposures by occupation or the extent of control measures have been shown, as by far the chief exposure was organic dust and the control measure was only applied to this exposure.

TABLE 173—LUMBER AND FURNITURE INDUSTRIES—EXPOSURES TO SPECIFIED MATERIALS

Materials	All lumber and furniture plants in survey		Number and percent of workers exposed									
			Furniture		Caskets		Piano, organs, etc.		Planing and milling		Other wood-working	
Total number of workers.....	15,254		9,008		1,032		1,733		341		3,140	
Number of plants.....	234		106		16		11		10		91	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Acids, organic.....	5	*	2	*			1	*			2	*
Acids, mineral.....	107	0.7	24	*	67	6.5	3	*	4	1.2	9	*
Aldehydes.....	2	*	1	*	1	*						
Alkalies.....	112	0.7	36	*	45	4.4	5	*	4	1.2	22	0.7
Anilines.....	2	*	1	*							1	*
Coal tar products.....	164	1.1	34	*	13	1.3	2	*	43	12.6	72	2.3
Cyanides.....	42	*	12	*	21	2.0	4	*	2	0.6	3	*
Asbestos.....	2	*	2	*								
Coal dust bituminous.....	127	0.8	59	0.7	10	1.0	13	0.8	3	0.9	42	1.3
Silica dust.....	173	1.1	62	0.7	50	4.8	54	3.1			7	*
Silicate dust.....	429	2.8	241	2.7	19	1.8	87	5.0	5	1.5	77	2.5
Non-siliceous dust.....	212	1.4	106	1.2	54	5.2	20	1.2			32	1.0
Organic dust.....	6759	44.3	4330	48.0	236	22.8	518	29.8	145	42.5	1530	48.7
Dye.....	441	2.9	316	3.5	4	*	50	2.9			71	2.3
Dermatitis.....	293	1.9	190	2.1	67	6.5	12	0.7			24	0.8
Fluorides.....	8	*	8	*								
Carbon monoxide.....	42	*	13	*	2	*	5	*			22	0.7
Other gases.....	115	0.8	66	0.7	8	0.8	16	0.9			25	0.8
Chlorine.....	2	*									2	*
Chromium.....	46	*	29	*	15	1.5						
Lead.....	281	1.8	32	*	193	18.7	3	*			53	1.7
Antimony.....	13	*			13	1.3						
Other metals.....	414	2.7	158	1.8	119	11.5	37	2.1	2	0.6	98	3.1
Nitrogen oxides.....	22	*			22	2.1						
Infection.....	167	1.1	167	1.9								
Alcohols, esters and ether.....	1027	6.7	654	7.3	68	6.6	87	5.0	2	0.6	216	6.9
Halogenated hydrocarbons.....	40	*	11	*	2	*					27	0.9
Ink.....	52	*	10	*	1	*	4	*	3	0.9	34	1.1
Lacquer.....	940	6.2	592	6.6	52	5.0	88	5.1	2	0.6	206	6.6
Oil.....	340	2.2	259	2.9	7	0.7	26	1.5	3	0.9	45	1.4
Organic solvents.....	854	5.6	570	6.3	14	1.4	59	3.4	3	0.9	208	6.6
Petroleum.....	544	3.6	381	4.2	32	3.1	81	4.7	4	1.2	46	1.5
Paint.....	252	1.7	118	1.3	1	*	3	*	1	*	129	4.1
Other salts.....	6	*	2	*					3	0.9	1	*
Sulphur.....	14	*	1	*	13	1.3						

*—Denotes less than 1/2 of 1%

TABLE 178—MAJOR EXPOSURES OF THE CHIEF OCCUPATIONS IN THE CASKET INDUSTRY

Number of Workers in Survey.....1032
 Number of Workers Exposed..... 610
 Percent of Workers Exposed.....59.1%
 Number of Exposures per Person Exposed..... 1.9

Occupation	Organic dust	Lead	Other metals	Alcohols, esters and ethers	Dermatitis producers	Acids, mineral	Non-siliceous dust	Lacquers	Silica dust	Alkalies
Number of workers exposed.....	236	193	119	68	67	67	54	52	50	45
Percent of workers exposed.....	22.8	18.7	11.5	6.6	6.5	6.5	5.2	5.0	4.8	4.4
Wood machine operators	•									
Body makers	•									
Panel and top makers	•									
Buffers and polishers	•		•		•		•		•	
Machinists	•				•		•			
Laborers	•				•					
Cabinet makers	•									
Sewers	•									
Liners	•									
Trimmers	•								•	
Sanders	•									
Assemblers	•	•				•	•			
Pillow stuffers	•									
Platers	•	•	•			•				•
Cleaners	•	•	•	•	•	•		•		•
Sprayers	•						•			
Solderers	•	•	•				•		•	
Grinders	•	•	•				•			
Casters	•	•	•				•			
Welders	•	•	•							
Tinsmiths	•	•	•							
Foremen	•	•	•							

TABLE 179—PERCENT OF WORKERS EXPOSED TO SPECIFIED MATERIALS HAVING INDICATED TYPE OF HAZARD CONTROL—CASKET INDUSTRY

Materials	Number of exposures	Percent of exposed workers having specified control								
		Positive ventilation	Negative ventilation	Local exhaust	Isolation	Wet method	Gas masks	Respirators	Pressure helmets	Other
All specified materials	1,149		4.3	35.0		1.4		2.2		6.2
Organic dust	236		8.0	47.8						
Lead	193			2.6				1.6		
Other metals	119		5.0	53.8				5.0		13.5
Alcohols, esters and ethers	68			76.5				1.5		
Dermatitis	67									
Acids, mineral	67		9.0							23.9
Non-siliceous dust	54			74.0		1.9		5.5		
Lacquer	52			82.8				21.2		
Silica dust	50			80.0		6.0				
Alkalies	45		13.3	15.6						42.2
Petroleum	32									
Nitrogen oxides	22		27.3							
Cyanide	21		28.6							47.7
Silicate dust	19					58.7				
Chromium	15			100.0						
Organic solvents	14			21.4						
Coal tar products	13			100.0						
Antimony	13			7.7						
Sulphur	13									77.0
Coal dust bituminous	10					10.0				
Other gases	8			25.0						
Oil	7									
Dye	4									
Halogenated hydrocarbons	2									
Carbon monoxide	2			100.0						
Aldehydes	1									
Ink	1									
Paint	1			100.0				100.0		

TABLE 180—MAJOR EXPOSURES OF THE CHIEF OCCUPATIONS IN THE PIANO AND ORGAN INDUSTRY

Number of Workers in Survey.....	1733
Number of Workers Exposed.....	844
Percent of Workers Exposed.....	48.6%
Number of Exposures per Person Exposed.....	1.4

Occupation	Organic dust	Lacquer	Alcohols, esters and ethers	Silicate dust	Petroleum	Other organic solvents	Silica dust	Dyes	Other metals	Oil
Number of workers exposed.....	518	88	87	87	81	59	54	50	37	26
Percent of workers exposed.....	29.8	5.1	5.0	5.0	4.7	3.4	3.1	2.9	2.1	1.5
Molders.....	•			•			•		•	
Core makers.....				•			•		•	•
Laborers.....				•			•		•	
Sand blasters.....				•			•		•	
Fillers.....	•		•	•		•	•		•	•
Polishers and buffers.....	•	•		•			•		•	•
Foremen.....				•	•					
Rubbers.....	•			•		•				
Sanders.....	•			•					•	
Wood machine operators.....	•									
Assemblers.....	•									
Gluers.....	•	•				•				
Stainers.....						•				
Oilers.....			•		•					•
Painters and sprayers.....		•	•			•		•		•
Finishers.....		•	•					•		
Platers.....									•	
Machinists and mechanics.....					•				•	•
Gilders.....									•	
Patchers.....	•	•	•			•			•	
Inspectors.....					•	•				

TABLE 181—PERCENT OF WORKERS EXPOSED TO SPECIFIED MATERIALS HAVING INDICATED TYPE OF HAZARD CONTROL—PIANO AND ORGAN INDUSTRY

Materials	Number of exposures	Percent of exposed workers having specified control								
		Positive ventilation	Negative ventilation	Local exhaust	Isolation	Wet method	Gas masks	Respirators	Pressure helmets	Other
All specified materials.....	1,178	5.7	-----	36.0	0.3	4.5	-----	2.4	-----	1.5
Organic dust.....	518	8.5	-----	56.3	0.2	1.2	-----	1.0	-----	3.5
Lacquer.....	88	5.7	-----	41.0			-----	12.5	-----	
Silicate dust.....	87	2.3	-----	5.8		42.6	-----		-----	
Alcohols, esters and ether.....	87	4.6	-----	35.6			-----	13.8	-----	
Petroleum.....	81		-----				-----		-----	
Organic solvents.....	59		-----	8.5			-----	1.7	-----	
Silica dust.....	54	3.7	-----	27.8	1.9		-----		-----	
Dye.....	50	10.0	-----	16.0		2.0	-----	8.0	-----	
Other metals.....	37		-----	45.8	2.7		-----		-----	
Oil.....	26	7.7	-----				-----		-----	
Non-siliceous dust.....	20		-----	50.0		45.0	-----		-----	
Other gases.....	16		-----				-----		-----	
Coal dust bituminous.....	13		-----				-----		-----	
Dermatitis.....	12		-----				-----		-----	
Alkalies.....	5	20.0	-----				-----		-----	
Carbon monoxide.....	5		-----	60.0			-----		-----	
Ink.....	4		-----				-----		-----	
Cyanide.....	4		-----				-----		-----	
Acids, mineral.....	3		-----				-----		-----	
Lead.....	3		-----				-----		-----	
Paint.....	3	33.3	-----	33.3			-----	33.3	-----	
Coal tar products.....	2		-----	100.0			-----		-----	
Acids, organic.....	1	100.0	-----				-----		-----	

PAPER, PRINTING AND ALLIED INDUSTRIES

Paper, Printing and Allied Industries

The paper, printing and allied industries were represented by 20,751 workers in 341 plants. These workers were in the following classifications: Blank books, envelopes, and tags; wall paper; paper and pulp mills; paper box factories; job printing; bookmaking and binding; engraving; lithographing; newspapers; and stereotyping and electrotyping industries. The largest number of workers surveyed were in the lithographing, newspapers and paper box industries. Of the 20,751 workers, 51.8 per cent were exposed, and each exposed worker averaged 2.3 exposures to specified materials. The major exposures were organic solvents, ink, lead and antimony. It was found that 39 of the 49 specified materials, used to record exposures, occurred in these industries. Table 182 reveals the number and per cent of workers exposed to specified materials. Table 183 reveals the number and percentage of total exposures to specified materials, or the distribution of each exposure. This table shows that the chief exposure to organic solvents was in the lithographing industry; the chief exposure to ink was in the lithographing and newspaper industries; the chief exposure to lead was in the newspaper, lithographing, stereotyping and electrotyping industries; and the chief exposure to antimony was in the newspaper, lithographing, stereotyping and electrotyping industries. Table 184 reveals the extent to which control measures have been applied in these industries. Negative general, positive general and local exhaust ventilation were the most prevalent types of control measures in these industries.

Blank Books, Envelopes and Tag Industry: The blank books, envelopes and tag industry was represented by 1204 workers in 17 plants. Of these 1204 workers, 29.7 per cent were exposed, and each exposed worker averaged 2.1 exposures to specified materials. The major exposures were ink and organic solvents. It was found that 23 of the 49 specified materials, used to record exposures, occurred in this industry. Table 185 reveals the major exposures of the chief occupations in this industry. Table 186 reveals the extent to which control measures have been applied. Local exhaust and negative general ventilation were the most prevalent types of control measures.

Wall Paper Industry: The wall paper industry was represented by 551 workers in 4 plants. Of these 551 workers, 55.6 per cent were exposed, and each exposed worker averaged 2.8 exposures to specified materials. The major exposures were dyes and organic dust. It was found that 21 of the 49 specified materials, used to record exposures, occurred in this industry. Table 187 reveals the major exposures of the chief occupations in this industry. Table 188 reveals the extent to which control measures have been applied. Positive and negative general ventilation were found to be the most prevalent types of control measures in this industry.

Paper and Pulp Industry: The paper and pulp industry was represented by 523 workers in 4 plants. Of these 523 workers, 64.3 per cent were exposed, and each exposed worker averaged 2.7 exposures to specified materials. The major exposures were organic dust, alkalies, dyes, silicatt dust and other salts. It was found that 20 of the 49 specified materials, used to record exposures, occurred in this industry. Table 189 reveals the major exposures of the chief occupations in this industry. Table 190 reveals the extent to which control measures have been applied. It was found that none of the indicated types of control measures had any wide application in this industry.

Paper Box Industry: The paper box industry was represented by 3220 workers in 39 plants. Of these 3220 workers, 21.1 per cent were exposed, and each exposed worker averaged 1.7 exposures to specified materials. The major exposures were organic dust, ink and organic solvents. It was found that 22 of the 49 specified materials, used to record exposures, occurred in this industry. Table 191 reveals the major exposures of the chief occupations in this industry. Table 192 reveals the extent to which control measures have been applied. It was found that none of the indicated types of control measures had any wide application in this industry.

Job Printing Industry: The job printing industry was represented by 669 workers in 12 plants. Of these 669 workers, 74.4 per cent were exposed, and each exposed worker averaged 2.1 exposures to specified materials. The major exposures were organic solvents, ink, lead and antimony. It was found that 20 of the 49 specified materials, used to record exposures, occurred in this industry. Table 193 reveals the major exposures of the chief occupations in this industry. Table 194 reveals the extent to which control measures have been applied. It was found that negative and positive general ventilation were the most prevalent types of control measures in this industry.

Bookmaking and Binding Industry: The bookmaking and binding industry was represented by 1784 workers in 33 plants. Of these 1784 workers, 45.4 per cent were exposed, and each exposed worker averaged 2.1 exposures to specified materials. The major exposures were ink, organic solvents, organic dust, lead and antimony. It was found that 26 of the 49 specified materials, used to record exposures, occurred in this industry. Table 195 reveals the major exposures of the chief occupations in this industry. Table 196 reveals the extent to which control measures have been applied. It was found that local exhaust ventilation was the most prevalent type of control measure in this industry.

Engraving Industry: The engraving industry was represented by 2012 workers in 44 plants. Of these 2012 workers, 66.7 per cent were exposed, and each exposed worker averaged 2.6 exposures to specified materials. The major exposures were organic solvents, ink, "other metals" and mineral acids. It was found that 37 of the 49 specified materials, used to record exposures, occurred in this industry. Table 197 reveals the major exposures of the chief occupations in this industry. Table 198 reveals the extent to which control measures have been applied. It was found that negative general, positive general and local exhaust ventilation were the most prevalent types of control measures in this industry.

Lithographing Industry: The lithographing industry was represented by 6649 workers in 121 plants. Of these 6649 workers, 52.5 per cent were exposed, and each exposed worker averaged 2.4 exposures to specified materials. The major exposures were organic solvents, ink, lead and antimony. It was found that 34 of the 49 specified materials, used to record exposures, occurred in this industry. Table 199 reveals the major exposures of the chief occupations in this industry. Table 200 reveals the extent to which control measures have been applied. It was found that negative general and local exhaust ventilation were the most prevalent types of control measures in this industry.

Newspaper Industry: The newspaper industry was represented by 3367 workers in 38 plants. Of these 3367 workers, 69.2 per cent were exposed, and each exposed worker averaged 2.2 exposures to specified materials. The major exposures were lead, antimony, ink and organic solvents. It was found that 27 of the 49 specified materials, used to record exposures, occurred in this industry. Table 201 reveals the major exposures of the chief occupations in this industry. Table 202 reveals the extent to which control measures have been applied. It

was found that negative general, positive general and local exhaust ventilation were the most prevalent types of control measures in this industry.

Stereotyping and Electrotyping Industry: The stereotyping and electrotyping industry was represented by 772 workers in 29 plants. Of these 772 workers, 81.5 per cent were exposed, and each exposed worker averaged 2.9 exposures to specified materials. The major exposures were lead, antimony, organic solvents and ink. It was found that 24 of the 49 specified materials, used to record exposures, occurred in this industry. Table 203 reveals the major exposures of the chief occupations in this industry. Table 204 reveals the extent to which control measures have been applied. It was found that local exhaust and negative general ventilation were the most prevalent types of control measures in this industry.

TABLE 182.—PAPER, PRINTING AND ALLIED INDUSTRIES—EXPOSURES TO SPECIFIED MATERIALS

Materials	Number and percent of workers exposed											
	All paper and printing industries in survey		Blank book, envelopes, tags, etc.		Wallpaper		Paper and pulp		Paper boxes		Job printing	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Total number of workers.....	20,751		1,204	551	523	3,220	669	1,784	33	2,012	6,649	3,367
Number of plants.....	341		17	4	4	39	12	33	44	121	38	772
Acids, organic.....	463	2.2										
Acids, mineral.....	666	3.2										
Aldehydes.....	35	0.2	7	0.6	10	1.8	43	8.2	17	0.5	24	3.6
Alkalies.....	491	2.4	8	0.7	2	0.2	136	26.0	41	1.3	25	3.7
Amines.....	50	0.2										
Chemicals.....	13	0.1										
Coal tar products.....	390	1.9	1	0.1	32	9.4	2	0.4	2	0.1	23	3.5
Cyanides.....	187	0.9	4	0.4	8	1.5	37	7.0	15	0.5	7	1.0
Coal dust bituminous.....	110	0.5	11	0.9	8	1.5	37	7.0	15	0.5	7	1.0
Silica dust.....	24	0.1										
Sulfate dust.....	339	1.6	26	2.2	69	12.5	77	14.7	42	1.3	7	1.0
Non-siliceous dust.....	135	0.7			1	0.1			5	0.2	3	0.5
Organic dust.....	1529	7.4	64	5.3	190	27.2	245	46.9	250	7.8	17	2.5
Dye.....	525	2.5	29	2.4	222	40.3	107	20.5	33	1.0	8	1.2
Dermatitis.....	119	0.6	38	3.2	5	0.9			27	0.8		
Fluorides.....	51	0.2										
Carbon monoxide.....	317	1.5	7	0.6	1	0.1	3	0.6	49	1.5	1	0.1
Sulphur dioxide.....	2	0.0										
Other gases.....	527	2.5	20	1.7	10	1.8	10	1.9	61	1.9	10	1.5
Chlorine.....	11	0.1	5	0.4			5	1.0				
Chromium.....	599	2.9			31	5.6			2	0.1	16	2.4
Cadmium.....	8	0.0										
Mercury.....	89	0.4										
Manganese.....	38	0.2										
Lead.....	2835	13.7	54	4.5	31	5.6	7	1.3	16	0.5	94	14.1
Antimony.....	2989	13.0	43	3.6					13	0.4	94	14.1
Other metals.....	882	4.3	35	2.9	55	10.0	9	1.7	53	1.7	36	5.4
Nitrogen oxides.....	112	0.5										
Infection.....	42	0.2										
Alcohols, esters and ethers.....	967	4.7	31	2.6	7	1.3	42	8.0	20	0.6	58	8.7
Halogenated hydrocarbons.....	56	0.3										
Ink.....	4414	21.3	159	13.2	6	1.1	2	0.4	106	3.3	223	33.4
Lacquer.....	253	1.2	2	0.2					6	0.2	45	6.7
Oil.....	183	0.9	4	0.4					6	0.2	15	2.2
Organic solvents.....	4536	21.9	137	11.4	85	15.4	36	6.9	194	6.0	283	42.3
Petroleum.....	558	2.7	31	2.6	3	0.5	12	2.3	107	3.3	43	6.5
Paint.....	262	1.3	2	0.2			13	2.5				
Other salts.....	496	2.4	21	1.8	24	4.4	77	14.7				
Sulphur.....	123	0.6					27	5.2				

*—Denotes less than 1/2 of 1%

TABLE 1-3 PAPER, PRINTING AND ALLIED INDUSTRIES EXPOSURES TO SPECIFIED MATERIALS

Materials	All paper and printing industries in survey	Number and percentage of total exposures to the specified materials																				News-papers	Litho-graphing	Stereotyping and electrotyping
		Blank book, envelopes, tags, etc.		Wallpaper		Paper and pulp		Paper boxes		Job printing		Book making and book binding		Engraving		Litho-graphing		No.	%					
		No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%							
Total number of workers	20,751	1,204	551	523	3,220	669	1,784	2,012	6,649	3,367	772													
Total number of exposures	25,112	730	848	802	1,134	1,034	1,725	3,408	8,306	5,247	1,629													
Acids, organic	463																							
Acids, mineral	666	7	1.0	10	1.5	43	6.5	2	0.4	45	9.7	8	1.7	188	40.7	144	31.1	57	12.3	19	4.1			
Aldehydes	35							17	2.6	24	3.6	17	2.6	226	33.7	204	30.7	75	11.3	43	6.5			
Alkalies	491	8	1.6	2	0.4	136	27.6	41	8.4	25	5.0	1	0.2	115	23.5	94	19.2	31	6.3	38	7.8			
Anilines	50																							
Chemicals	13																							
Coal tar products	396	1	0.2	52	13.1	2	15.6	2	0.5	23	5.8	10	2.5	133	33.6	97	24.5	61	15.5	17	4.3			
Cyanides	187	4	2.1									3	2.7	66	35.4	54	28.8	56	30.0	6	3.2			
Coal dust bituminous	110	11	10.0	8	7.3	37	33.7	15	13.6	2	1.8	3	12.5	8	35.3	11	45.9	9	8.2					
Silica dust	24											5	1.5	17	5.0	79	23.3	16	4.7	1	0.3			
Silicate dust	339	26	7.6	69	20.4	77	22.7	42	12.4	7	2.1	17	5.5	65	48.2	25	18.5	3	2.2	33	24.2			
Non-siliceous dust	135							5	3.7	3	2.2													
Organic dust	1,529	64	4.2	150	9.8	245	16.0	250	16.4	17	1.1	205	13.5	159	10.5	303	19.8	69	4.5	67	4.2			
Dye	525	29	5.5	222	42.3	107	20.4					33	6.3	61	11.6	49	9.3	24	4.6					
Dermatitis	119	38	31.9	5	4.2			27	22.7									25	21.1					
Fluorides	51											1	2.0	10	20.0	40	78.0	100	31.6	57	18.0			
Carbon monoxide	317	7	2.2					49	15.5	1	0.3	17	5.4	2	100.0	82	25.8							
Sulphur dioxide	2											29	5.5	49	9.3	158	30.1	118	22.4	62	11.7			
Other gases	527	20	3.8	10	1.9	5	45.4	61	11.5	10	1.9			1	9.2									
Chlorine	11	5	43.4									18	3.0	158	26.5	280	46.8	89	14.7	5	0.9			
Chromium	599							2	0.3	16	2.7													
Cadmium	8																							
Mercury	89							13	14.6															
Manganese	38																							
Lead	2,835	64	1.9	31	1.0	7	0.3	16	0.6	94	3.3	191	6.7	38	100.0									
Antimony	2,689	43	1.6					13	0.5	94	3.5	190	7.1	56	2.0	703	26.1	1179	43.9	449	15.9			
Other metals	882	35	4.0	55	6.2	9	1.0	53	6.0	36	4.1	16	1.8	259	30.4	272	30.8	72	8.2	75	8.5			
Nitrogen oxides	112																							
Infection	42							42	100.0															
Alcohols, esters and ethers	967	31	3.2	7	0.7			20	2.0	58	6.0	44	4.6	143	14.8	473	49.0	163	16.8	28	2.9			
Halogenated hydrocarbons	56																							
Ink	4,414	159	3.6	6	0.1	2	3.7	10	17.8	4	2.3	474	10.7	456	71.4	4	7.1							
Lacquer	233	2	0.9	1	0.4			196	4.4	223	5.2	2	0.6	42	18.0	102	43.8	22	9.5	7	3.0			
Oil	183	4	2.2	34	18.6	36	19.7	6	3.3	15	8.2	9	4.9	10	5.5	49	26.8							
Organic solvents	4,536	137	3.3	85	1.9	2	*	194	4.3	283	6.2	412	9.1	642	14.2	1999	41.0	674	14.6	108	2.4			
Petroleum	558	31	5.6	3	0.5	12	2.2	107	19.0			11	2.0	49	8.8	181	32.4	102	18.4	4	1.1			
Paint	262	2	0.8									1	0.4	130	49.5	83	31.7	33	12.6					
Other salts	496	21	4.2	24	4.9	77	15.5					11	2.2	174	35.0	83	16.8	77	15.5	29	5.9			
Sulphur	123																			3	2.4			

* Denotes less than 0.1%

TABLE 184—PERCENT OF WORKERS EXPOSED TO SPECIFIED MATERIALS HAVING INDICATED TYPE OF HAZARD CONTROL—PAPER, PRINTING AND ALLIED INDUSTRIES

Materials	Number of exposures	Percent of exposed workers having specified control								
		Positive ven-tilation	Negative ven-tilation	Local exhaust	Isola-tion	Wet method	Gas masks	Respi-rators	Pressure helmets	Other
All specified materials	25, 112	15.4	23.4	10.5	1.0	0.9	-----	0.2	-----	3.5
Organic solvents	4, 536	16.7	21.5	0.8	0.1	-----	-----	0.1	-----	1.7
Ink	4, 414	18.8	27.7	0.4	0.5	-----	-----	-----	-----	1.1
Lead	2, 835	16.2	24.4	18.6	0.5	-----	-----	-----	-----	0.6
Antimony	2, 689	16.7	24.3	19.3	0.5	-----	-----	-----	-----	0.6
Organic dust	1, 529	3.5	7.5	14.4	-----	2.2	-----	0.9	-----	-----
Alcohols, esters and ethers	967	20.1	28.1	14.4	0.8	-----	-----	-----	-----	7.9
Other metals	882	11.4	19.4	8.5	0.3	6.7	-----	-----	-----	10.3
Acids, mineral	665	15.0	20.4	28.5	5.4	-----	-----	-----	-----	21.3
Chromium	599	17.5	28.4	3.0	2.3	-----	-----	-----	-----	9.7
Petroleum	558	13.6	63.6	5.7	2.9	-----	-----	-----	-----	2.9
Other gases	527	2.1	9.7	4.6	0.8	-----	-----	-----	-----	0.9
Dye	525	13.9	18.7	5.3	0.6	1.7	-----	-----	-----	1.7
Other salts	496	8.3	17.4	0.4	1.2	-----	-----	1.2	-----	18.6
Alkalies	491	13.8	18.5	14.0	11.2	0.2	-----	1.2	-----	7.9
Acids, organic	463	25.4	33.7	8.9	2.2	-----	-----	-----	-----	10.6
Coal tar products	396	22.7	33.3	12.9	-----	-----	-----	-----	-----	6.8
Silicate dust	339	4.7	7.7	4.7	0.3	20.6	-----	2.4	-----	-----
Carbon monoxide	317	-----	6.3	64.4	1.2	-----	-----	-----	-----	-----
Paint	262	25.2	25.6	1.1	-----	-----	-----	1.1	-----	-----
Lacquer	233	38.2	40.3	16.7	-----	-----	-----	-----	-----	9.3
Cyanide	187	12.9	12.3	11.8	-----	-----	-----	-----	-----	30.0
Oil	183	8.7	14.8	15.3	-----	-----	-----	-----	-----	4.9
Non-siliceous dust	135	8.2	25.9	2.2	-----	11.9	-----	-----	-----	-----
Sulphur	123	17.9	34.9	3.3	-----	-----	-----	4.9	-----	2.4
Dermatitis	119	-----	-----	-----	-----	-----	-----	-----	-----	-----
Nitrogen oxides	112	-----	6.3	33.9	-----	-----	-----	-----	-----	-----
Coal dust bituminous	110	-----	6.8	0.9	-----	8.2	-----	-----	-----	0.9
Mercury	89	14.6	25.9	-----	-----	-----	-----	-----	-----	4.5
Halogenated hydro-carbons	56	44.6	48.2	32.2	-----	-----	-----	-----	-----	12.5
Fluorides	51	11.8	11.8	9.8	5.9	-----	-----	-----	-----	-----
Anilines	50	20.0	32.0	-----	-----	-----	-----	-----	-----	6.0
Infection	42	-----	-----	-----	-----	-----	-----	-----	-----	-----
Manganese	38	94.6	94.6	92.4	92.4	-----	-----	-----	-----	2.6
Aldehydes	35	11.4	14.3	25.7	11.4	-----	-----	-----	-----	-----
Silica dust	24	8.3	8.3	12.5	4.2	83.3	-----	-----	-----	-----
Chemicals	13	15.4	46.2	15.4	-----	-----	-----	-----	-----	23.1
Chlorine	11	-----	45.5	-----	45.5	-----	-----	-----	-----	-----
Cadmium	8	-----	-----	-----	-----	-----	-----	-----	-----	-----
Sulphur dioxide	2	-----	-----	100.0	-----	-----	-----	-----	-----	-----

TABLE 185 MAJOR EXPOSURES OF THE CHIEF OCCUPATIONS IN THE BLANK BOOK, ENVELOPE AND TAG INDUSTRY

Number of Workers in Survey	1204
Number of Workers Exposed	358
Percent of Workers Exposed	29.7%
Number of Exposures per Person Exposed	2.1

[illegible]

TABLE 186—PERCENT OF WORKERS EXPOSED TO SPECIFIED MATERIALS HAVING INDICATED TYPE OF HAZARD CONTROL—BLANK BOOK, ENVELOPE AND TAG INDUSTRY

[illegible]

TABLE 187—MAJOR EXPOSURES OF THE CHIEF OCCUPATIONS IN THE WALL PAPER INDUSTRY

Number of Workers in Survey.....	551
Number of Workers Exposed.....	306
Percent of Workers Exposed.....	55.6%
Number of Exposures per Person Exposed.....	2.8

[illegible]

TABLE 188—PERCENT OF WORKERS EXPOSED TO SPECIFIED MATERIALS HAVING INDICATED TYPE OF HAZARD CONTROL—WALL PAPER INDUSTRY

[illegible]

TABLE 189—MAJOR EXPOSURES OF THE CHIEF OCCUPATIONS IN THE PAPER AND PULP INDUSTRY

Number of Workers in Survey.....	523
Number of Workers Exposed	336
Percent of Workers Exposed.....	64.3%
Number of Exposures per Person Exposed.....	2.7

[illegible]

TABLE 190—PERCENT OF WORKERS EXPOSED TO SPECIFIED MATERIALS HAVING INDICATED TYPE OF HAZARD CONTROL—PAPER AND PULP MILL INDUSTRY

[illegible]

TABLE 191—MAJOR EXPOSURES OF THE CHIEF OCCUPATIONS IN THE PAPER BOX INDUSTRY

Number of Workers in Survey.....	3220
Number of Workers Exposed.....	680
Percent of Workers Exposed.....	21.1%
Number of Exposures per Person Exposed.....	1.7

Occupation	Organic dust	Ink	Other organic solvents	Petroleum	Other gases	Other metals	Carbon monoxide	Alkalise
Number of workers exposed.....	250	196	194	107	61	53	49	41
Percent of workers exposed.....	7.8	6.1	6.0	3.3	1.9	1.7	1.5	1.3
Box machine operators.....	●			●	●		●	●
Assemblers.....	●							●
Corrugating machine operators.....	●							●
Fibre machine operators.....	●							●
Cutters, slitters.....	●							●
Staplers.....	●							●
Glue workers (pasters, stayers, etc.).....	●							●
Foremen.....	●							●
Feeders.....	●	●	●			●		
Packers.....	●			●				
Printers (pressmen).....	●	●	●			●		
Sawyers.....	●							
Balers.....	●							
Laborers.....	●							
Scrapers.....	●							
Janitors.....	●							
Machinists.....	●		●	●	●	●	●	
Set-up and maintenance men.....	●			●	●			
Die makers and setters.....	●			●		●		
Cleaners.....	●	●	●					

TABLE 192—PERCENT OF WORKERS EXPOSED TO SPECIFIED MATERIALS HAVING INDICATED TYPE OF HAZARD CONTROL—PAPER BOX INDUSTRY

Materials	Number of exposures	Percent of exposed workers having specified control								
		Positive ventilation	Negative ventilation	Local exhaust	Isolation	Wet method	Gas masks	Respirators	Pressure helmets	Other
All specified materials.....	1, 134	3.2	3.7	3.9	2.0	1.2				
Organic dust.....	250		0.4	6.4						
Ink.....	196	5.6	6.7							
Organic solvents.....	194	4.1	4.6							
Petroleum.....	107	1.9	3.8	14.1	14.1					
Other gases.....	61			1.6	6.6					
Other metals.....	53	20.7	20.7			13.2				
Carbon monoxide.....	49			16.4	8.2					
Silicate dust.....	42	4.8	4.8			16.6				
Alkalies.....	41									
Dermatitis.....	27									
Alcohols, esters and ether.....	20			10.0						
Acids, mineral.....	17									
Lead.....	16		6.3							
Coal dust bituminous.....	15	13.4	13.4							
Antimony.....	13		7.7							
Halogenated hydrocarbons.....	10									
Lacquer.....	6									
Oil.....	6									
Non-siliceous dust.....	5									
Chromium.....	2		100.0							
Acids, organic.....	2									
Coal tar products.....	2			100.0						

TABLE 193—MAJOR EXPOSURES OF THE CHIEF OCCUPATIONS IN THE JOB PRINTING INDUSTRY

Number of Workers in Survey..... 669
 Number of Workers Exposed..... 497
 Percent of Workers Exposed..... 74.4%
 Number of Exposures per Person Exposed..... 2.1

Occupation	Other organic solvents	Ink	Lead	Antimony	Alcohols, esters and ethers	Lacquer	Acids, organic	Other metals	Alkalies	Acids, mineral	Coal tar products	Organic dust	Chromium	Oil
Number of workers exposed.....	283	223	94	94	58	45	45	36	25	24	23	17	16	15
Percent of workers exposed.....	42.3	33.4	14.1	14.1	8.7	6.7	6.7	5.4	3.7	3.6	3.5	2.5	2.4	2.2
Printers, pressmen.....	•	•			•	•								•
Transfer men.....	•						•			•				
Artists.....	•				•									
Linotypers, compositors.....			•	•										
Lacquerers, coaters.....					•	•								
Photographers.....							•		•		•		•	
Engravers, etchers.....								•		•		•		
Leaf layers.....								•						
Cutters.....												•		
Porters, dusters, janitors.....												•		

TABLE 194—PERCENT OF WORKERS EXPOSED TO SPECIFIED MATERIALS HAVING INDICATED TYPE OF HAZARD CONTROL—JOB PRINTING INDUSTRY

Materials	Number of exposures	Percent of exposed workers having specified control								
		Positive ventilation	Negative ventilation	Local exhaust	Isolation	Wet method	Gas masks	Respirators	Pressure helmets	Other
All specified materials.....	1,034	55.8	62.0	6.3	1.0	0.8		0.6		0.7
Organic solvents.....	283	71.1	79.5							2.5
Ink.....	223	62.7	66.4							
Lead.....	94		24.5	22.4	5.3					
Antimony.....	94		24.5	22.4	5.3					
Alcohols, esters and ether.....	58	84.5	84.5	10.4						
Lacquer.....	45	66.5	66.5	13.3						
Acids, organic.....	45	77.8	77.8							
Other metals.....	36	50.0	50.0							
Alkalies.....	25	52.0	52.0							
Acids, mineral.....	24	91.5	91.5							
Coal tar products.....	23	56.4	56.4							
Organic dust.....	17	35.3	35.3					35.3		
Chromium.....	16	81.2	81.2							
Oil.....	15									
Mercury.....	13	100.0	100.0							
Other gases.....	10			100.0						
Silicate dust.....	7	85.7	100.0			85.7				
Non-siliceous dust.....	3									
Silica dust.....	2	100.0	100.0			100.0				
Carbon monoxide.....	1		100.0	100.0						

TABLE 195—MAJOR EXPOSURES OF THE CHIEF OCCUPATIONS IN THE BOOK BINDING AND MAKING INDUSTRY

Number of Workers in Survey.....	1784
Number of Workers Exposed.....	811
Percent of Workers Exposed.....	45.4%
Number of Exposures per Person Exposed.....	2.1

Occupation	Ink	Other organic solvents	Organic dust	Lead	Antimony	Alcohols, esters and ethers	Dye	Gas	Carbon monoxide
Number of workers exposed.....	474	412	205	191	190	44	33	29	17
Percent of workers exposed.....	26.6	23.0	11.5	10.7	10.6	2.5	1.9	1.6	1.0
Pressmen, printers.....	●●●	●●●	●●			●			●●
Feeders.....	●●●	●●●	●●				●		●●
Artists.....	●●●	●●●							
Compositors.....	●●●	●●●		●●	●●				
Packers, balers.....			●●						
Linotypers, stereotypers.....				●●	●●				
Plate makers.....						●●		●●	

TABLE 196—PERCENT OF WORKERS EXPOSED TO SPECIFIED MATERIALS HAVING INDICATED TYPE OF HAZARD CONTROL—BOOK MAKING AND BINDING INDUSTRY

[illegible]

TABLE 201—MAJOR EXPOSURES OF THE CHIEF OCCUPATIONS IN THE NEWSPAPER INDUSTRY

Number of Workers in Survey.....3367
 Number of Workers Exposed.....2332
 Percent of Workers Exposed.....69.2%
 Number of Exposures per Person Exposed.....2.2

Occupation	Lead	Antimony	Ink	Other organic solvents	Alcohols, esters and ethers	Other gas	Petroleum	Carbon monoxide	Chromium	Salt
Number of workers exposed.....	1189	1179	926	674	163	118	102	100	89	77
Percent of workers exposed.....	35.3	35.0	27.5	20.0	4.8	3.5	3.0	3.0	2.6	2.3
Linotype operators.....	•	•				•		•		
Machine compositors.....	•	•						•		
Castors, monotype casters.....	•	•						•		
Pressmen.....	•	•	•	•	•	•				
Floormen.....	•	•	•	•	•					
Stereotypers.....	•	•				•		•		
Typesetters.....	•	•								
Composers.....	•	•		•	•					
Shavers, routers, cutters, trimmers.....	•	•								
Proofers.....				•	•					
Photo engravers.....			•	•	•				•	•
Plate makers.....			•	•	•				•	
Make-up men.....			•	•	•					
Cleaners, washers.....			•	•	•		•			
Photographers.....					•		•			•
Mechanics and maintenance men.....							•			

TABLE 202—PERCENT OF WORKERS EXPOSED TO SPECIFIED MATERIALS HAVING INDICATED TYPE OF HAZARD CONTROL—NEWSPAPER INDUSTRY

Materials	Number of exposures	Percent of exposed workers having specified control								
		Positive ventilation	Negative ventilation	Local exhaust	Isolation	Wet method	Gas masks	Respirators	Pressure helmets	Other
All specified materials.....	5,247	35.4	39.6	13.3	0.3	0.3		0.0		3.2
Lead.....	1,189	38.2	41.4	18.5	0.7					
Antimony.....	1,179	37.6	40.9	18.7	0.7					
Ink.....	926	40.2	43.6	0.8						
Organic solvents.....	674	14.7	19.3	1.8						
Alcohols, esters and ether.....	163	68.0	68.0							13.5
Other gases.....	118		3.4	55.9						4.2
Petroleum.....	102	58.8	67.6					0.1		
Carbon monoxide.....	100		4.0	66.0						
Chromium.....	89	36.0	51.7	9.0						30.4
Other salts.....	77	48.1	48.1							44.2
Acids, mineral.....	75	37.3	37.3	60.0						25.3
Other metals.....	72	73.5	73.5	4.2		5.6				40.2
Organic dust.....	69	59.4	59.4	49.3						
Coal tar products.....	61	36.1	36.1	1.6				1.6		
Acids, organic.....	57	24.6	24.6	19.3						5.3
Cyanide.....	56	30.4	30.4							30.4
Sulphur.....	40	55.0	90.0							
Paint.....	33	48.4	48.4							
Mercury.....	33									
Alkalies.....	31	22.6	22.6	6.5						22.6
Dermatitis.....	25									
Dye.....	24	79.0	79.0							20.8
Lacquer.....	22	36.4	100.0							
Silicate dust.....	16		56.2			62.5				
Coal dust bituminous.....	9		75.0							
Aldehydes.....	4									
Non-siliceous dust.....	3	100.0	100.0	100.0		100.0				

TABLE 203—MAJOR EXPOSURES OF THE CHIEF OCCUPATIONS IN THE STEREOTYPING AND ELECTROTYPING

Number of Workers in Survey.....	772
Number of Workers Exposed.....	629
Percent of Workers Exposed.....	81.5%
Number of Exposures per Person Exposed.....	2.9

Occupation	Lead	Antimony	Other organic solvents	Ink	Other metals	Organic dust	Petroleum	Other gases	Carbon monoxide	Acids, mineral
Number of workers exposed.....	449	411	108	84	75	67	62	62	57	43
Percent of workers exposed.....	58.2	53.3	14.0	10.9	9.7	8.7	8.0	8.0	7.4	5.6
Linotypers.....	●	●						●	●	
Compositors.....	●	●	●	●						
Typesetters.....	●	●								
Stereotypers.....	●	●						●	●	
Casters.....	●	●								
Routers.....	●	●								
Shippers.....	●	●								
Engravers.....			●	●	●					
Proofers.....				●						
Finishers.....	●	●			●	●				
Electrotypers, platers.....					●					●
Mounters, blockers.....						●				
Janitors.....	●	●				●				
Molders.....							●			
Builders.....							●			

TABLE 204—PERCENT OF WORKERS EXPOSED TO SPECIFIED MATERIALS HAVING INDICATED TYPE OF HAZARD CONTROL—STEREOTYPING AND ELECTROTYPING INDUSTRY

[illegible]

TEXTILE INDUSTRIES

Textile Industries

The textile industries were represented by 6925 workers in 74 plants. These workers were in the following classifications: cotton goods; knit goods; silk mills; dyeing and finishing; woolen and worsted; carpet mills; hemp, jute and linen mills; embroidery and lace; rope and cordage; tents and awnings; window shades; and miscellaneous industries. The largest number of workers surveyed were in the knit goods industry. Of the 6925 workers surveyed, 52.5 per cent were exposed, and each exposed worker averaged 1.6 exposures to specified materials. The major exposures were organic dust and dyes. It was found that 32 of the 49 specified materials, used to record exposures, occurred in these industries. Table 205 reveals the number and per cent of workers exposed to specified materials. Table 206 reveals the number and percentage of total exposures to specified materials, or the distribution of each exposure. This table shows that the chief exposure to organic dust was in the knit goods industry, and the chief exposure to dyes was in the knit goods and carpet industries. Table 207 reveals the extent to which control measures have been applied. It was found that negative general ventilation was the most prevalent type of control measure in these industries.

Cotton Goods Industry: The cotton goods industry was represented by 584 workers in 8 plants. Of these 584 workers, 83.1 per cent were exposed, and each exposed worker averaged 1.0 exposures to specified materials. The major exposure was organic dust. It was found that 10 of the 49 specified materials, used to record exposures, occurred in this industry. No table is shown for the major exposure of the chief occupations, because, aside from organic dust, all the exposures were less than one per cent. Table 208 reveals the extent to which control measures were applied. It was found that local exhaust ventilation and respirators were the only types of control measures in this industry.

Knit Goods Industry: The knit goods industry was represented by 2195 workers in 16 plants. Of these 2195 workers, 47.6 per cent were exposed, and each exposed worker averaged 1.8 exposures to specified materials. The major exposures were organic dust, dyes and chromium. It was found that 24 of the 49 specified materials, used to record exposures, occurred in this industry. Table 209 reveals the major exposures of the chief occupations in this industry. Table 210 reveals the extent to which control measures have been applied. It was found that negative general ventilation was the most prevalent type of control measure in this industry.

Silk Industry: The silk industry was represented by 996 workers in one plant. Of these 996 workers, 8.4 per cent were exposed, and each exposed worker averaged 1.1 exposures to specified materials. The major exposure, to which only 4.4 per cent of the workers were exposed, was petroleum products: therefore, no analyses of the exposures or the extent to which control measures have been applied were shown in this industry.

Dye and Finishing Industry: The dye and finishing industry was represented by 45 workers in 3 plants. This sample was not deemed of sufficient size to make any analyses.

Woolen and Worsted Industry: The woolen and worsted industry was represented by 285 workers in 3 plants. Of these 285 workers, 44.3 per cent were

exposed, and each exposed worker averaged 1.7 exposures to specified materials. The major exposures were organic dust, dyes and infections. It was found that 13 of the 49 specified materials, used to record exposures, occurred in this industry. Table 211 reveals the major exposures of the chief occupations in this industry. Table 212 reveals the extent to which control measures have been applied. It was found that local exhaust ventilation and isolation were the only types of control measures used in this industry.

Carpet Industry: The carpet industry was represented by 559 workers in 3 plants. Of these 559 workers, 86.6 per cent were exposed, and each exposed worker averaged 1.8 exposures to specified materials. The major exposures were organic dust and dyes. It was found that 9 of the 49 specified materials, used to record exposures, occurred in this industry. Table 213 reveals the major exposures of the chief occupations in this industry. Table 214 reveals the extent to which control measures have been applied. Local exhaust ventilation, isolation and respirators were the only types of control measures found in this industry.

Hemp, Jute and Linen Industry: The hemp, jute and linen industry was represented by 20 workers in one plant. This sample was not deemed of sufficient size to make any analyses.

Embroidery and Lace Industry: The embroidery and lace industry was represented by 709 workers in 9 plants. Of these 709 workers, 55.6 per cent were exposed, and each exposed worker averaged 1.1 exposures to specified materials. The major exposure was organic dust. It was found that 8 of the 49 specified materials, used to record exposures, occurred in this industry. Table 215 reveals the major exposures of the chief occupations in this industry. There were no types of recognized control measures found in this industry.

Rope, Cordage Industry: The rope and cordage industry was represented by 107 workers in one plant. This sample was not deemed of sufficient size to make any analyses.

Tent and Awning Industry: The tent and awning industry was represented by 104 workers in 7 plants. Of these 104 workers, 75.0 per cent were exposed, and each exposed worker averaged 1.8 exposures to specified materials. The major exposures were organic dust and organic solvents. It was found that 10 of the 49 specified materials, used to record exposures, occurred in this industry. Table 216 reveals the major exposures of the chief occupations in this industry. Table 217 reveals the extent to which control measures have been applied. Local exhaust and negative general ventilation were the only types of control measures found in this industry.

Window Shade Industry: The window shade industry was represented by 290 workers in 2 plants. Of these 290 workers, 44.5 per cent were exposed, and each exposed worker averaged 2.3 exposures to specified materials. The major exposures were lead, organic solvents, paint, and organic dust. It was found that 21 of the 49 specified materials, used to record exposures, occurred in this industry. Table 218 reveals the major exposures of the chief occupations in this industry. Table 219 reveals the extent to which control measures have been applied. It was found that positive general, negative general, local exhaust ventilation, respirators and protective clothing were the most prevalent types of control measures in this industry.

TABLE 203.—TEXTILE INDUSTRIES—EXPOSURES TO SPECIFIED MATERIALS

Materials	All textile industries in survey	Number and percent of workers exposed																		Window shades	Tents, awnings	Rope, cordage	Lace embroidery	Hemp, jute, linen	Carpets	Woolen and worsted	Dyeing, finishing	Silk mills	Knit goods		Cotton goods																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																								
		6,925		74		2,195		996		45		285		559		20		709											107		104		290		1,031																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																				
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* -Denotes less than 1/2 of 1%

TABLE 206--TEXTILE INDUSTRIES--EXPOSURES TO SPECIFIED MATERIALS

Materials		All textile industries in survey		Number and percentage of total exposures to the specified material																							
				Cotton goods		Knit goods		Silk mills		Dyeing, finishing		Woolen and worsted		Carpets		Hemp, jute, linen		Lace embroidery		Rope, cordage		Tents, awnings		Window shades		Other	
		No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Total number of workers.		584		2,195		996		45		285		559		20		709		107		104		290		1,031			
Total number of exposures		493		1,888		90		48		234		867		24		424		113		141		302		1,080			
Acids, organic.				9	18.8			4	5.2	2	2.5	13	16.4			5	10.4					5	10.4	29	60.4		
Acids, mineral.				20	25.3					1	2.8					5	6.3			3	3.8	3	3.8	29	36.7		
Aldehydes.				6	16.6																			29	80.6		
Alkalies.				28	23.3			11	9.1	10	8.2	13	10.7	4	3.3	2	1.7					5	4.1	48	39.6		
Chemicals.																											
Cyanides.				4	36.2																						
Coal dust bituminous.				6	15.9																						
Coal dust anthracite.		4	10.5	6	15.9			3	7.9	6	15.9					4	10.5	7	63.8			9	23.6	5	13.2		
Silica dust.				1	100.0																						
Silicic dust.				9	16.4			3	5.5	6	10.9					9	16.4	1	1.8	5	9.1	14	25.5	4	7.2		
Non-siliceous dust.																											
Organic dust.		465	14.6	938	29.6	27	0.8	6	0.2	100	3.2	451	14.2	20	0.6	374	11.8	94	3.0	56	1.8	6	85.7	1	100.0		
Dye.				431	50.2	6	0.7			52	6.2	308	35.7			8	0.9	1		14	1.6	5	0.6	35	4.1		
Dermatitis.		53	9.3	20	37.8			1	1.9	12	22.7							7	13.2			3	5.7	5	9.4		
Carbon monoxide.										1	5.6	11	61.0									4	22.2	1	5.6		
Sulphur dioxide.				1	100.0																						
Other gases.				9	13.8					2	3.1	19	29.3					1	1.5			4	6.1	30	46.2		
Chlorine.				3	7.4			6	14.6													3	7.3	29	77.1		
Chromium.				346	88.3																	17	4.3	7	1.7		
Lead.		2	2.4	4	4.8																	56	67.5	8	8.4		
Antimony.		2	100.0					1	1.2	12	14.5																
Other metals.				3	12.5																						
Infection.		1	1.1																								
Alcohols, esters and ethers.								4	16.6	1	4.2	3	12.5														
Halogenated hydrocarbons.								6	6.4	29	31.2	36	38.7														
Ink.				2	100.0																						
Oil.		28	7.1	2	7.1																						
Organic solvents.				13	32.5	6	15.0																				
Petroleum.		134	2	1.5	11	8.2	7	5.2	2	1.5																	
Paint.		121	6	5.0	18	14.8	44	36.5																			
Other salts.		74						1	1.3																		
Sulphur.				3	6.4							13	27.6														

* Denotes less than 0.1%

TABLE 207—PERCENT OF WORKERS EXPOSED TO SPECIFIED MATERIALS HAVING INDICATED TYPE OF HAZARD CONTROL—TEXTILE INDUSTRIES

[illegible]

TABLE 208—PERCENT OF WORKERS EXPOSED TO SPECIFIED MATERIALS HAVING INDICATED TYPE OF HAZARD CONTROL—COTTON GOODS INDUSTRY

[illegible]

TABLE 209—MAJOR EXPOSURES OF THE CHIEF OCCUPATIONS IN THE KNIT GOODS MANUFACTURING INDUSTRY

Number of Workers in Survey.....2195
 Number of Workers Exposed.....1045
 Percent of Workers Exposed.....47.6%
 Number of Exposures per Person Exposed.....1.8

Occupation	Organic dust	Dye	Chromium
Number of workers exposed.....	938	431	346
Percent of workers exposed.....	42.7	19.7	15.8
Knitters.....	●	●	●
Sewing machine operators.....	●	●	●
Winders.....	●	●	●
Finishers.....	●	●	●
Spinners.....	●	●	●
Loopers.....	●	●	●
Cutters.....	●	●	●
Foremen and inspectors.....	●	●	●
Waste sorters and pickers.....	●	●	●
Strippers.....	●	●	●
Brushers.....	●	●	●
Toppers.....	●	●	●
Dyers.....	●	●	●
Machinists and millwrights.....	●	●	●

TABLE 210—PERCENT OF WORKERS EXPOSED TO SPECIFIED MATERIALS HAVING INDICATED TYPE OF HAZARD CONTROL—KNIT GOODS INDUSTRY

Materials	Number of exposures	Percent of exposed workers having specified control								
		Positive ventilation	Negative ventilation	Local exhaust	Isolation	Wet method	Gas masks	Respirators	Pressure helmets	Other
All specified materials.....	1,888	2.7	4.8	1.2	2.7	0.3				0.1
Organic dust.....	938	5.3	2.8	0.9		0.4				
Dye.....	431		2.8	1.6	2.5					
Chromium.....	346		0.3	2.0	0.9					
Alkalies.....	28		71.4		35.5					
Acids, minerals.....	20		54.9		64.9					4.9
Dermatitis.....	20									
Petroleum.....	18									
Oil.....	13		76.9		76.9					
Organic solvents.....	11									
Acids, organic.....	9		33.3		33.3					
Silicate dust.....	9					11.1				
Other gases.....	9		11.1							
Aldehydes.....	6		33.3							
Coal dust bituminous.....	6									
Cyanide.....	4									
Lead.....	4									
Chlorine.....	3		66.5							
Other metals.....	3									
Other salts.....	3		33.3							
Halogenated hydrocarbons.....	2									
Ink.....	2									
Coal dust anthracite.....	1									
Carbon monoxide.....	1									
Sulphur dioxide.....	1		100.0							

TABLE 211.—MAJOR EXPOSURES OF THE CHIEF OCCUPATIONS IN THE WOOLEN AND WORSTED MANUFACTURING INDUSTRY

Number of Workers in Survey.....	285
Number of Workers Exposed.....	126
Percent of Workers Exposed.....	44.3%
Number of Exposures per Person Exposed.....	1.7

Occupation	Organic dust	Dye	Infection	Dermatitis producers	Lead	Alkalies
Number of workers exposed.....	100	52	29	12	12	10
Percent of workers exposed.....	35.0	18.2	10.2	4.2	4.2	3.5
Spinners.....	●●●	●●●				
Carders.....	●●●	●●●	●			
Cutters.....	●●●	●●●	●			
Beaters.....	●●●	●●●	●			
Maintenance men.....	●●●			●	●	
Dyers.....		●	●			●
Receivers.....			●			

TABLE 212—PERCENT OF WORKERS EXPOSED TO SPECIFIED MATERIALS HAVING INDICATED TYPE OF HAZARD CONTROL—WOOLEN AND WORSTED INDUSTRY

[illegible]

TABLE 213—MAJOR EXPOSURES OF THE CHIEF OCCUPATIONS IN THE CARPET MANUFACTURING INDUSTRY

Number of Workers in Survey..... 559
 Number of Workers Exposed..... 484
 Percent of Workers Exposed..... 86.6%
 Number of Exposures per Person Exposed..... 1.8

Occupation	Organic dust	Dye	Infection	Other gases	Salt	Acids, mineral	Alkalies	Carbon monoxide
Number of workers exposed.....	451	308	36	19	13	13	13	11
Percent of workers exposed.....	80.9	55.3	6.5	3.4	2.3	2.3	2.3	2.0
Weavers.....	•	•						
Winders.....	•	•						
Spinners.....	•	•						
Sewers.....	•	•	•					
Pickers.....	•	•	•					
Foremen and inspectors.....	•	•	•					
Sorters.....	•	•	•					
Cutters.....	•	•	•					
Dyers.....	•	•	•	•	•	•	•	•
Washers.....	•	•	•	•	•	•	•	•
Drivers.....	•	•	•	•	•	•	•	•

TABLE 214—PERCENT OF WORKERS EXPOSED TO SPECIFIED MATERIALS HAVING INDICATED TYPE OF HAZARD CONTROL—CARPET INDUSTRY

Materials	Number of exposures	Percent of exposed workers having specified control								
		Positive ventilation	Negative ventilation	Local exhaust	Isolation	Wet method	Gas masks	Respirators	Pressure helmets	Other
All specified materials.....	867			6.0	7.7			9.6		
Organic dust.....	451			5.5				9.3		
Dye.....	308			5.8	4.9			13.3		
Infection.....	36							13.9		
Other gases.....	19			21.1	68.3					
Acids, mineral.....	13				100.0					
Alkalies.....	13				100.0					
Other salts.....	13				100.0					
Carbon monoxide.....	11			45.5						
Other metals.....	3									

TABLE 215—MAJOR EXPOSURES OF THE CHIEF OCCUPATIONS IN THE EMBROIDERY AND LACE MANUFACTURING INDUSTRY

Number of Workers in Survey..... 709
 Number of Workers Exposed..... 394
 Percent of Workers Exposed..... 55.6%
 Number of Exposures per Person Exposed..... 1.1

Occupation	Organic dust	Petroleum	Dye
Number of workers exposed.....	374	17	8
Percent of workers exposed.....	52.8	2.4	1.1
Winders.....	•		
Table workers.....	•		
Curtain makers.....	•		
Spinners.....	•		
Maintenance men.....	•	•	
Mechanics.....	•	•	
Dyers.....	•		•

TABLE 216—MAJOR EXPOSURES OF THE CHIEF OCCUPATIONS IN THE TENT AND AWNING MANUFACTURING INDUSTRY

Number of Workers in Survey.....	104
Number of Workers Exposed.....	78
Percent of Workers Exposed.....	75.0%
Number of Exposures per Person Exposed.....	1.8

Occupation	Organic dust	Other organic solvents	Oil	Dye	Paint	Petroleum
Number of workers exposed.....	56	23	14	14	13	11
Percent of workers exposed.....	53.7	22.1	13.5	13.5	12.5	10.6
Sewing machine operators.....	●					
Finishers.....	●	●	●	●	●	●
Cutters.....	●					
Assemblers.....		●	●	●		
Impregnators.....			●	●		

TABLE 217—PERCENT OF WORKERS EXPOSED TO SPECIFIED MATERIALS HAVING INDICATED TYPE OF HAZARD CONTROL—TENT AND AWNING INDUSTRY

[illegible]

TABLE 218—MAJOR EXPOSURES OF THE CHIEF OCCUPATIONS IN THE WINDOW SHADES MANUFACTURING INDUSTRY

Number of Workers in Survey.....	290
Number of Workers Exposed.....	129
Percent of Workers Exposed.....	44.5%
Number of Exposures per Person Exposed.....	2.3

Occupation	Lead	Other organic solvents	Paint	Organic dust	Chromium	Silicate dust
Number of workers exposed.....	56	54	53	40	17	14
Percent of workers exposed.....	19.3	18.6	18.3	13.8	5.8	4.8
Painters, sprayers.....	••	••	••	•••	••	•
Mixers.....						
Carpenters (wood working machine operators).....				•••		
Sanders.....				•••		
Laborers.....				•••		•

TABLE 219—PERCENT OF WORKERS EXPOSED TO SPECIFIED MATERIALS HAVING INDICATED TYPE OF HAZARD CONTROL—WINDOW SHADE INDUSTRY

[illegible]

MISCELLANEOUS MANUFACTURING

Miscellaneous Manufacturing Industries

The miscellaneous manufacturing industries were represented by 38,352 workers in 472 plants. These workers were in the following classifications: brooms and brushes; buttons; electric light and power; electrical machinery; storage battery; lamps; dry cell battery; rubber; artificial flowers; mattress and bedding; signs; toys and novelties; hair goods; mirrors and lenses; lamp shades and shower curtains; scientific instruments; plastic moulding and fabrication; impregnated paper; wood preservation; and miscellaneous industries. The largest number of workers surveyed were in the electrical machinery industry. Of these 38,352 workers surveyed, 54.7 per cent were exposed, and each exposed worker averaged 1.9 exposures to specified materials. The major exposures were organic dust, lead and dermatitis producers. It was found that 47 of the 49 specified materials, used to record exposures, occurred in these industries. Table 220 reveals the number and per cent of workers exposed specified materials. Table 221 reveals the number and percentage of total exposures to specified materials, or the distribution of each exposure. This table shows that the chief exposure to organic dust was in the miscellaneous and electrical machinery industries; the chief exposure to lead was in the electrical machinery industry; and the chief exposure to dermatitis producers was in the electrical machinery industry. Table 222 reveals the extent to which control measures have been applied. Local exhaust negative general ventilation and protective clothing were found to be the most prevalent types of control measures in these industries.

Broom and Brush Industry: The broom and brush industry was represented by 697 workers in 21 plants. Of these 697 workers, 68.8 per cent were exposed, and each exposed worker averaged 1.5 exposures to specified materials. The major exposure was organic dust. It was found that 27 of the 49 specified materials, used to record exposures, occurred in this industry. Table 223 reveals the major exposures of the chief occupations in this industry. Table 224 reveals the extent to which control measures have been applied. It was found that local exhaust and negative general ventilation were the most prevalent types of control measures in this industry.

Button Industry: The button industry was represented by 192 workers in 3 plants. However, these plants were not characteristic of the button industry, therefore, no analyses were made.

Electric Light and Power Industry: The electric light and power industry was represented by 28 workers in one plant. This sample was not deemed of sufficient size to make any analyses.

Electrical Machinery Industry: The electrical machinery industry was represented by 16,985 workers in 117 plants. Of these 16,985 workers, 51.7 per cent were exposed, and each exposed worker averaged 1.8 exposures to specified materials. The major exposures were lead, dermatitis producers, "other metals" and petroleum. It was found that 39 of the 49 specified materials, used to record exposures, occurred in this industry. Table 225 reveals the major exposures of the chief occupations in this industry. Table 226 reveals the extent to which control measures have been applied. It was found that local exhaust, negative general ventilation and protective clothing were the most prevalent types of control measures in this industry.

Storage Battery Industry: The storage battery industry was represented by 400 workers in 14 plants. Of these 400 workers, 92.0 were exposed, and each exposed worker averaged 2.4 exposures to specified materials. The major exposures were lead, antimony, mineral acids, gases and petroleum. It was found that 20 of the 49 specified materials, used to record exposures, occurred in this industry. Table 227 reveals the major exposures of the chief occupations in this industry. Table 228 reveals the extent to which control measures have been applied. It was found that local exhaust ventilation, respirators and protective clothing were the most prevalent types of control measures in this industry.

Lamp Industry: The lamp industry was represented by 2043 workers in 31 plants. Of these 2043 workers, 47.0 per cent were exposed, and each exposed worker averaged 2.1 exposures to specified materials. The major exposures were dermatitis producers, "other metals" and organic dust. It was found that 36 of the 49 specified materials, used to record exposures, occurred in this industry. Table 229 reveals the major exposures of the chief occupations in this industry. Table 230 reveals the extent to which control measures have been applied. It was found that local exhaust and negative general ventilation were the most prevalent types of control measures in this industry.

Dry Cell Battery Industry: The dry cell battery industry was represented by 299 workers in one plant. Of these 299 workers, 67.0 per cent were exposed, and each exposed worker averaged 2.0 exposures to specified materials. The major exposures were lead, organic dust, "other metals" and dermatitis producers. It was found that 22 of the 49 specified materials, used to record exposures, occurred in this industry. Table 231 reveals the major exposures of the chief occupations in this industry. Table 232 reveals the extent to which control measures have been applied. It was found that protective clothing and local exhaust ventilation were the most prevalent types of control measures in this industry.

Rubber Industry: The rubber industry was represented by 3646 workers in 27 plants. Of these 3646 workers, 63.5 per cent were exposed, and each exposed worker averaged 2.8 exposures to specified materials. The major exposures were silicate dust, non-siliceous dust, organic solvents, organic dust and petroleum. It was found that 33 of the 49 specified materials, used to record exposures, occurred in this industry. Table 233 reveals the major exposures of the chief occupations in this industry. Table 234 reveals the extent to which control measures have been applied. It was found that local exhaust ventilation and protective clothing were the most prevalent types of control measures in this industry.

Artificial Flower Industry: The artificial flower industry was represented by 81 workers in 5 plants. This sample was not deemed of sufficient size to make any analyses.

Mattress and Bedding Industry: The mattress and bedding industry was represented by 1502 workers in 26 plants. Of these 1502 workers, 48.4 per cent were exposed, and each exposed worker averaged 1.3 exposures to specified materials. The major exposures were organic dust and petroleum. It was found that 27 of the 49 specified materials, used to record exposures, occurred in this industry. Table 235 reveals the major exposures of the chief occupations in this industry. Table 236 reveals the extent to which control measures have been applied. It was found that local exhaust ventilation, respirators and protective clothing were the most prevalent types of control measures in this industry.

Sign Industry: The sign industry was represented by 808 workers in 25 plants. Of these 808 workers, 52.6 per cent were exposed, and each exposed worker averaged 2.9 exposures to specified materials. The major exposures were

lead, organic solvents, paint and "other metals". It was found that 30 of the 49 specified materials, used to record exposures, occurred in this industry. Table 237 reveals the major exposures of the chief occupations in this industry. Table 238 reveals the extent to which control measures have been applied. It was found that local exhaust ventilation and protective clothing were the most prevalent types of control measures in this industry.

Toy and Novelty Industry: The toy and novelty industry was represented by 2626 workers in 45 plants. Of these 2626 workers, 49.4 per cent were exposed, and each exposed worker averaged 1.9 exposures to specified materials. The major exposures were organic dust, alcohols, esters and ethers, organic solvents and dermatitis producers. It was found that 31 of the 49 specified materials, used to record exposures, occurred in this industry. Table 239 reveals the major exposures of the chief occupations in this industry. Table 240 reveals the extent to which control measures have been applied. It was found that local exhaust and negative general ventilation were the most prevalent types of control measures in this industry.

Hair Goods Industry: The hair goods industry was represented by 362 workers in 6 plants. Of these 362 workers, 93.7 per cent were exposed, and each exposed worker averaged 2.0 exposures to specified materials. The major exposures were infections and organic dust. It was found that 11 of the 49 specified materials, used to record exposures, occurred in this industry. Table 241 reveals the major exposures of the chief occupations in this industry. Table 242 reveals the extent to which control measures have been applied. It was found that local exhaust ventilation was the most prevalent type of control measure in this industry.

Mirror and Lens Industry: The mirror and lens industry was represented by 493 workers in 19 plants. Of these 493 workers, 60.7 per cent were exposed, and each exposed worker averaged 2.0 exposures to specified materials. The major exposures were silicate dust and "other metals". It was found that 26 of the 49 specified materials, used to record exposures, occurred in this industry. Table 243 reveals the major exposures of the chief occupations in this industry. Table 244 reveals the extent to which control measures have been applied. It was found that wet methods was the most prevalent type of control measure in this industry.

Lamp Shade and Shower Curtain Industry: The lamp shade and shower curtain industry was represented by 350 workers in 8 plants. Of these 350 workers, 14.3 per cent were exposed, and each exposed worker averaged 2.0 exposures to specified materials. The major exposures were lacquer and alcohols, esters and ethers. It was found that 10 of the 49 specified materials, used to record exposures, occurred in this industry. Table 245 reveals the major exposures of the chief occupations in this industry. Table 246 reveals the extent to which control measures have been applied. It was found that local exhaust ventilation and respirators were the only control measures used in this industry.

Scientific Instrument Industry: The scientific instrument industry was represented by 1842 workers in 42 plants. Of these 1842 workers, 52.4 per cent were exposed, and each exposed worker averaged 1.7 exposures to specified materials. The major exposure was dermatitis producers. It was found that 33 of the 49 specified materials, used to record exposures, occurred in this industry. Table 247 reveals the major exposures of the chief occupations in this industry. Table 248 reveals the extent to which control measures have been applied. It was found that local exhaust ventilation and wet methods were the most prevalent types of control measures in this industry.

Plastic Moulding and Fabricating Industry: The plastic moulding and fabricating industry was represented by 1229 workers in 15 plants. Of these 1229 workers, 64.8 per cent were exposed, and each exposed worker averaged 2.0 exposures to specified materials. The major exposures were coal tar products, organic dust, petroleum and aldehydes. It was found that 21 of the 49 specified materials, used to record exposures, occurred in this industry. Table 249 reveals the major exposures of the chief occupations in this industry. Table 250 reveals the extent to which control measures have been applied. It was found that local exhaust and negative general ventilation were the most prevalent types of control measures in this industry.

Impregnated Paper Industry: The impregnated paper industry was represented by 704 workers in 7 plants. Of these 704 workers, 73.6 per cent were exposed, and each exposed worker averaged 1.6 exposures to specified materials. The major exposures were lacquer, alcohols, esters and ethers and petroleum. It was found that 13 of the 49 specified materials, used to record exposures, occurred in this industry. Table 251 reveals the major exposures of the chief occupations in this industry. Table 252 reveals the extent to which control measures have been applied. It was found that negative general and positive general ventilation were the most prevalent types of control measures in this industry.

Wood Preservation Industry: The wood preservation industry was represented by 451 workers in 7 plants. Of these 451 workers, 45.9 per cent were exposed, and each exposed worker averaged 1.5 exposures to specified materials. The major exposures were coal tar products and organic dust. It was found that 15 of the 49 specified materials, used to record exposures, occurred in this industry. Table 253 reveals the major exposures of the chief occupations in this industry. Table 254 reveals the extent to which control measures have been applied. It was found that protective clothing and local exhaust ventilation were the most prevalent types of control measures in this industry.

TABLE 220—MISCELLANEOUS MANUFACTURING INDUSTRIES—EXPOSURES TO SPECIFIED MATERIALS

Materials	All miscel- laneous industries in survey	Number and percent of workers exposed																																										
		Brooms and brushes		Buttons		Electric light and power		Electrical machinery		Storage batteries		Lamps, etc.		Dry cells		Rubber		Artificial flowers		Mattresses and bedding		Signs		Toys and novelties		Hair goods		Mirrors and lenses		Lamp shades, shower curtains, etc.		Scientific instruments		Plastic molding and fabricating		Impregnated paper		Wood preservation		Other				
		No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%					
Total number of workers.....	38,352	697		192		28		16,985		400		2,043		299		3,646		81		1,502		808		2,626		362		493		350		1,842		1,229		704		461		3,614				
Number of plants.....	472	21		3		1		117		14		31		1		27		5		26		25		45		6		19		8		42		15		7		7		52				
Acids, organic.....	56	0.2							5	*						24	0.7			8	0.5			2	*			5	1.0			1	*					10	*					
Acids, mineral.....	889	2.3	2	*	3	1.6			361	2.1	142	35.3	132	6.5	7	2.3	37	1.0			9	0.6	34	4.2	10	*			8	1.6			43	2.3	21	1.7					80	2.2		
Accelerators.....	195	0.5											5	*			185	5.1			4	*																	5	*				
Aldehydes.....	284	0.7	4	0.6					121	0.7			2	*							15	1.0	36	4.5	50	1.9	16	4.4	3	0.6			45	2.4	1	*					4	*		
Alkalies.....	1096	2.9	1	*	3	1.6			382	2.3	12	3.0	136	6.7	10	3.3	245	6.7																						132	3.7			
Anilines.....	19	*															18	0.5																						1	*			
Amines.....	152	*															151	4.1																						1	*			
Chemicals.....	80	*							22	*	1	*	1	*	6	2.0	25	0.7			1	*	1	*									14	0.8							9	*		
Coal tar products.....	1056	2.8	4	0.6					297	1.8	15	3.8	9	*	29	9.7	3				3	*	14	1.7	15	0.6			1	*			17	0.9			481	39.2			129	28.6		
Cyanides.....	277	0.7							134	0.8			66	3.2							4	*	2	*	21	0.8	13	3.6	1	*			16	0.9	1	*					19	0.5		
Asbestos.....	24	*							10	*			2	*			3	*															9	0.5										
Coal dust, bituminous.....	189	*	4	0.6	2	1.0	7	25.0	48	*	1	*			6	2.0	31	0.9			6	*	2	*	15	0.6	4	1.1	4	0.8			6				25	5.6	15	*				
Coal dust, anthracite.....	65	*							2	*							9	*															63	5.1							36	1.0		
Silica dust.....	823	2.1	10	1.4					383	2.3			91	4.5			9	*					33	4.1	119	4.5			28	5.7			34	1.9	80	6.5					157	4.4		
Silicate dust.....	2928	7.6	5	0.7	2	1.0	2	7.1	884	5.2	1	*	69	3.4	8	2.7	1214	33.3	6	7.4	11	0.7	61	7.6	106	4.0	4	1.1	173	35.2			110	6.0	95	7.7	20	4.4	122	3.4				
Non-siliceous dust.....	2473	6.5	6	0.9					801	4.7	4	1.0	138	6.8	1	*	1125	30.9	2	2.5			12	1.5	98	3.7			48	9.8			90	4.9	23	1.9	3	0.7	1092	30.3				
Organic dust.....	5077	13.2	436	62.5	5	2.6			816	4.8	8	2.0	199	9.8	67	22.4	598	16.4	11	13.6	555	36.9	62	7.7	390	14.9	313	86.5	30	6.1	13	3.7	124	6.7	306	24.9	52	11.5	35	1.0				
Dye.....	278	0.7	15	2.2					14	*			8	*			139	3.8							34	1.3							11	0.6	6	0.5			6		223	6.2		
Dermatitis.....	3542	9.2	12	1.7	17	8.9			2368	14.0	1	*	259	12.7	39	13.0	18	0.5			4	*	22	2.7	189	7.2			8	1.6			298	16.2	59	4.8	12	1.7	13	2.9	51	1.4		
Fluorides.....	247	0.6							117	0.7																							15	0.8							8	*		
Carbon monoxide.....	372	1.0	15	2.2	1	0.5	5	12.9	149	0.9	30	7.5	26	1.3	1	*	27	0.7			4	*	50	6.2	34	1.3			6	1.2			14	0.8										
Hydrogen sulphide.....	7	*																																										
Sulphur dioxide.....	57	*	44	6.3					329	1.9	91	22.8	35	1.7	2	0.7	48	1.3	2	2.5	9	0.6	70	8.7	65	2.5	1	*	18	3.7			32	1.7			11	1.6	9	2.0	12	*		
Other gases.....	755	2.0	16	2.3	1	0.5			7	*			1	*							7	0.5																				16	*	
Chlorine.....	38	*																																								24	0.7	
Arsenic.....	60	*																																								49	1.4	
Chromium.....	351	0.9							94	0.6			24	1.2	23	7.7	138	3.8			1	*	39	4.8	3	*	1	*	1	*			9	0.5			9	2.0	9	*				
Cadmium.....	128	*			3	1.6			73	*			22	1.2			2	*																	26	1.4					6	*		
Mercury.....	122	*							32	*					23	7.7																										5	*	
Manganese.....	87	*	2	*																	8	0.5																						
Lead.....	3828	10.0	3	*			1	3.7	2613	15.4	302	76.6	146	7.2	82	27.4	157	4.3			7	0.5	153	19.0	130	5.0			9	1.8			133	7.2			7	1.0	1	*	84	2.3		
Antimony.....	216	0.6							4	*	163	40.8					8	*															1	*							6	*		
Selenium.....	1	*																																										
Other metals.....	2818	7.4	3	*	3	1.6			1516	8.9	2	0.5	39	1.9	39	13.0	320	8.8	8	9.9	10	0.7	87	10.8	149	5.7	1	*	111	22.6	13	3.7	145	7.9	53	4.3			12	2.7	125	3.5		
Nitrogen oxides.....	153	*							86	0.5											78	5.2			3	*			12	2.4			7	*							6	*		
Infection.....	599	1.6	68	9.8					655	3.9	6	1.5	117	5.7	1	*	97	2.7	9	11.1	3	*	44	5.5	244	9.3			31	6.3	21	6.0	70	3.8			233	33.0			128	3.6		
Alcohols, esters and ethers.....	1895	4.8	33	4.7					186	1.1			2	*			21	0.6							2	*							18	1.0	2	*					252	7.0		
Halogenated hydrocarbons.....	288	0.7							155	0.5			6	*			6	*																							53	1.5		
Ink.....	342	0.9	6	0.9					17	*			2	*			10	*																									91	2.5
Lacquer.....	1476	4.8	32	4.6																																								

TABLE 221—MISCELLANEOUS MANUFACTURING INDUSTRIES—EXPOSURES TO SPECIFIED MATERIALS

Materials	All miscellaneous manufacturing industries in survey	Number and percentage of total exposures to the specified materials																																									
		Brooms and brushes		Buttons		Electric light and power		Electrical machinery		Storage batteries		Lamps, etc.		Dry cell batteries		Rubber goods		Artificial flowers		Mattresses and bedding		Signs		Toys and novelties		Hair goods		Mirrors and lenses		Lamp shades, shower curtains, etc.		Scientific instruments		Plastic molding and fabricating		Impregnated paper		Wood preservation		Other			
Total number of workers.....	38,352	697		192		28		16,985		400		2,043		299		3,646		81		1,502		808		2,626		362		493		350		1,842		1,229		704		451		3,614			
Total number of exposures.....	40,154	739		76		15		15,454		895		2,027		404		6,475		56		940		1,213		2,421		683		586		100		1,604		1,558		846		308		3,754			
		No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%		
Acids, organic.....	56							5	8.8			1	1.8			24	42.9			8	14.3			2	3.6			5	8.9			1	1.8							10	17.9		
Acids, mineral.....	889	2	0.2	3	3			361	40.6	142	16.0	132	14.7	7	0.8	37	4.2			9	1.0	34	3.8	10	1.1			8	0.9			43	5.0	21	2.4					80	9.0		
Accelerators.....	195											5	2.6			185	94.8																							5	2.6		
Aldehydes.....	284	4	1.4					121	42.6			2	0.7							4	1.4			29	10.2							2	0.7	118	41.6					4	1.4		
Alkalies.....	1,096	1	0.1	3	0.3			382	34.7	12	1.1	136	12.4	10	0.9	245	22.4			15	1.4	36	3.3	50	4.6	16	1.5	3	0.3			45	4.1	1	0.1	9	0.8			132	12.0		
Anilines.....	19															18	94.7																						1	5.3			
Amines.....	152															151	99.3																						1	0.7			
Chemicals.....	80							22	27.5	1	1.3	1	1.3	6	7.5	25	31.3			1	1.3	1	1.3								14	17.5							9	11.0			
Coal tar products.....	1,056	4	*					297	28.0	15	1.4	9	0.9	29	3.9	3	*			3	*	14	1.3	15	1.4			1	*			17	1.6	481	45.5			129	12.2	39	3.7		
Cyanides.....	277							134	48.4			66	23.9							4	1.4	2	0.7	21	7.6	13	4.7	1	0.4			16	5.8	1	0.4					19	6.7		
Asbestos.....	24							10	41.7			2	8.3			3	12.5															9	37.5										
Coal dust: bituminous.....	189	4	2.1	2	1.1	7	3.7	48	25.4	1	0.5	7	3.7	6	3.2	31	16.4			6	3.2	2	1.1	15	7.9	4	2.1	4	2.1			6	3.2					25	13.2	15	7.9		
Coal dust: anthracite.....	65							2	3.1																																		
Silica dust.....	823	10	1.2					383	46.6			91	11.0			9	1.1					33	4.0	119	14.5			28	3.4			34	4.1	80	9.7					36	4.4		
Silicate dust.....	2,928	5	0.2	2	0.1	2	0.1	884	30.1	1	*	69	2.4	8	0.3	1214	41.5	6	0.2	11	0.4	61	2.1	106	3.6	4	0.1	173	5.9			110	3.8	95	3.2			20	0.7	157	5.2		
Non-siliceous dust.....	2,473	6	0.2					801	32.4	4	0.2	138	5.6	1	*	1125	45.5	2	0.1			12	0.5	98	4.0			48	1.9			90	3.6	23	0.9			3	0.1	122	4.9		
Organic dust.....	5,077	436	8.6	5	0.1			816	16.1	8	0.2	199	3.9	67	1.3	598	11.8	11	0.2	555	10.9	62	1.2	390	7.7	313	6.2	30	0.6	13	0.3	124	2.4	306	6.0			52	1.0	1092	21.5		
Dye.....	273	15	5.4					14	5.0			8	2.9			139	50.0	6	2.2	3	1.1			34	12.0					1	0.4	11	4.0	6	2.2			6	2.2			35	12.6
Dermatitis.....	3,542	12	0.3	17	0.5			2368	66.9	1	*	259	7.2	39	1.1	18	0.5			4	0.1			22	0.6	189	5.3	8	0.2			298	8.5	59	1.7	12	0.3	13	0.4	223	6.3		
Fluorides.....	247							117	47.3																							15	6.1					9	3.6	51	20.7		
Carbon monoxide.....	372	15	4.0	1	0.3	5	1.3	149	40.1	30	8.1	26	7.0	1	0.3	27	7.3			4	1.1	50	13.4	34	9.0			6	1.6			14	3.8			2	0.5	8	2.2				
Hydrogen sulphide.....	7																																										
Sulphur dioxide.....	57	44	77.1																																								
Other gases.....	755	16	2.0	1	0.1			329	43.6	91	12.1	35	4.6	2	0.3	48	6.4	2	0.3	9	1.2	70	9.3	65	8.6	1	0.1	18	2.4			32	4.2			11	1.5	9	1.2	16	2.1		
Chlorine.....	38							7	18.4											7																						24	63.2
Arsenic.....	60							1	1.7			1	1.7																												40	81.1	
Chromium.....	351							94	26.6			24	6.8	23	6.6	138	39.3			1	0.3	39	11.1	3	0.9	1	0.3	1	0.3			9	2.6			9	2.6			9	2.6		
Cadmium.....	128			3	2.3			73	57.0			22	17.4			2	1.6																3	2.3					6	4.7			
Mercury.....	122							32	26.3					23	18.8																	26	21.3					5	4.1				
Manganese.....	87	2	2.3											26	29.8					8	9.2																						
Lead.....	3,828	3	0.1			1	*	2613	68.2	302	7.9	146	3.8	82	2.1	157	4.1			7	0.2	153	4.0	130	3.4			9	0.2			133	3.5			7	0.2	1	*	84	2.2		
Antimony.....	216							4	1.9	163	75.4					8	3.7					2	0.9	25	11.6							1	0.5			7	3.2			6	2.8		
Selenium.....	1							1	100.0																																		
Other metals.....	2,818	3	0.1	3	0.1			1516	53.6	2	0.1	221	7.9	39	1.4	320	11.4	8	0.3	10	0.4	87	3.1	149	5.3	1	*	111	3.9	13	0.5	145	5.2	53	1.9			12	0.4	125	4.4		
Nitrogen Oxides.....	153							86	56.2			39	25.5																														
Infection.....	599	68	11.4																78	13.0																							
Alcohols, esters and ethers.....	1,835	33	1.8					655	35.6	6	0.3	117	6.4	1	0.1	97	5.3	9	0.5	3	0.2	44	2.4	244	13.4			31	1.7	21	1.1	70	3.8			19	1.0	233	12.7			128	21.3
Halogenated hydrocarbons.....	288							186	64.6							21	7.3															18	6.3	2	0.7					53	18.4		
Ink.....	342	6	1.8					17	5.0			2	0.6			10	2.9																									91	26.6
Lacquer.....	1,476	32	2.2					641	43.3	7	0.5	87	5.9	1	0.1	43	2.9	9	0.6	3	0.2	36	2.4	112	7.6			44	3.0	22	1.5	69	4.7	12	0.8			64	18.7	97			

TABLE 222—PER CENT OF WORKERS EXPOSED TO SPECIFIED MATERIALS HAVING INDICATED TYPE OF HAZARD CONTROL—MISCELLANEOUS MANUFACTURING INDUSTRIES

Materials	Number of exposures	Percent of exposed workers having specified control								
		Positive ven-tilation	Negative ven-tilation	Local exhaust	Isola-tion	Wet method	Gas masks	Respi-rators	Pressure helmets	Other
All specified materials	40,154	2.4	9.3	26.7	2.8	4.2	-----	2.7	0.1	8.2
Organic dust	5,077	1.0	7.4	33.4	0.8	1.4	-----	2.7	-----	0.1
Lead	3,828	0.7	11.3	25.9	0.5	-----	-----	2.9	-----	9.2
Dermatitis	3,542	0.7	6.2	0.1	-----	-----	-----	2.7	-----	17.4
Petroleum	3,068	1.0	6.5	10.1	1.3	-----	-----	0.6	-----	18.1
Silicate dust	2,928	0.7	6.0	23.8	4.8	20.8	-----	2.1	0.1	1.5
Other metals	2,818	0.4	7.9	42.5	5.0	12.2	-----	5.2	0.3	7.1
Non-siliceous dust	2,473	7.1	1.9	38.8	-----	10.6	-----	4.3	-----	3.7
Organic solvents	2,180	0.9	11.3	18.5	2.6	-----	-----	1.7	0.1	6.4
Alcohols, esters and ether	1,835	13.2	21.8	25.8	3.5	-----	-----	3.6	-----	4.9
Lacquer	1,476	15.8	22.8	32.1	4.3	-----	0.1	8.6	-----	5.9
Alkalies	1,096	0.1	10.2	21.1	13.5	10.8	-----	2.0	-----	19.9
Coal tar products	1,056	-----	-----	30.4	0.7	0.6	0.3	2.1	-----	15.9
Acid, mineral	889	0.3	18.9	17.9	3.6	-----	-----	1.3	-----	18.9
Silica dust	823	1.5	1.6	38.9	18.1	14.5	-----	4.1	0.6	-----
Other gases	755	2.7	14.1	36.6	2.1	-----	0.1	0.3	-----	0.5
Oil	620	1.3	14.7	26.6	2.9	-----	-----	-----	-----	18.7
Infection	599	0.8	4.5	-----	-----	-----	-----	-----	-----	4.7
Paint	496	1.2	10.5	35.9	-----	-----	-----	9.9	0.6	15.9
Carbon monoxide	372	4.6	14.5	60.0	4.0	0.5	-----	-----	-----	0.8
Chromium	351	0.3	9.1	60.7	4.0	1.7	-----	6.0	-----	50.5
Ink	342	1.2	33.6	15.8	-----	-----	-----	1.5	-----	2.0
Sulphur	306	0.7	8.8	49.0	-----	-----	-----	5.6	-----	1.6
Halogenated hydrocarbons	288	-----	8.0	50.3	0.4	-----	-----	-----	-----	0.7
Aldehydes	284	2.5	9.5	26.4	-----	-----	-----	0.4	-----	0.7
Dye	278	5.4	11.1	50.7	-----	-----	-----	6.5	-----	37.4
Cyanide	277	-----	-----	33.2	-----	-----	-----	0.7	-----	15.2
Fluorides	247	-----	2.4	15.4	4.1	45.7	-----	6.9	-----	8.1
Antimony	216	2.3	11.6	28.7	-----	-----	0.5	8.8	-----	22.2
Accelerators	195	0.5	5.1	58.0	-----	-----	-----	6.7	-----	1.5
Coal dust bituminous	189	4.8	-----	-----	-----	6.4	-----	-----	-----	-----
Amines	159	-----	1.3	73.0	-----	-----	-----	1.3	-----	-----
Nitrogen Oxides	153	0.7	24.2	57.0	-----	-----	-----	-----	-----	3.9
Other salts	149	5.4	10.8	4.7	2.0	-----	-----	-----	-----	8.1
Cadmium	128	-----	14.1	14.1	-----	-----	-----	-----	-----	28.8
Mercury	122	-----	8.2	10.6	10.6	-----	-----	0.8	-----	12.3
Manganese	87	-----	2.3	28.7	2.3	10.6	0.1	12.7	-----	19.6
Chemicals	80	1.3	11.2	1.3	-----	-----	-----	-----	-----	-----
Coal dust, anthracite	65	-----	-----	-----	38.5	-----	-----	-----	-----	-----
Arsenic	60	-----	-----	1.7	-----	-----	-----	1.7	-----	1.7
Sulphur dioxide	57	-----	3.5	24.6	3.5	-----	-----	-----	-----	-----
Acids, organic	56	8.9	37.6	8.9	-----	-----	-----	-----	-----	1.8
Phosphorus	52	-----	-----	90.7	-----	-----	-----	-----	-----	-----
Chlorine	38	-----	52.6	7.9	-----	-----	-----	-----	-----	-----
Asbestos	24	-----	8.3	37.5	-----	-----	-----	-----	-----	-----
Anilines	19	-----	-----	-----	-----	-----	-----	-----	-----	-----
Hydrogen sulphide	7	-----	-----	100.0	-----	-----	-----	-----	-----	-----
Selenium	1	-----	-----	-----	-----	-----	-----	-----	-----	-----

TABLE 225—MAJOR EXPOSURES OF THE CHIEF OCCUPATIONS IN THE ELECTRICAL MACHINERY INDUSTRY

Number of Workers in Survey.....	16985
Number of Workers Exposed.....	8787
Percent of Workers Exposed.....	51.7%
Number of Exposures per Person Exposed.....	1.8

Occupation	Lead	Dermatitis producers	Other metals	Petroleum silicate dust	Organic dust	Non-siliceous dust	Alcohols, esters and ethers	Lacquer	Other organic solvents	Silica dust	Alkalies	Acids, mineral	Other gas	Oil	Coal tar products	Halogenated hydro- carbons	
Number of worker exposed.....	2613	2368	1516	1374	884	816	801	655	641	463	383	382	361	329	305	297	186
Percent of workers exposed.....	15.4	14.0	8.9	8.1	5.2	4.8	4.7	3.9	3.8	2.7	2.3	2.3	2.1	1.9	1.8	1.8	1.1
Assemblers (radio, etc.).....	•		•	•			•	•	•			•	•			•	•
Coil winders.....								•									
Solderers.....	•							•									
Repairmen.....	•								•			•			•		
Cablemakers.....	•																
Maintenance men (mechanics).....	•			•													
Tool and die makers.....	•	•		•		•								•			
Draw and punch press operators.....		•		•			•										
Drill and screw machine operators.....		•		•					•								
Machinists.....		•		•													
Buffers and polishers.....		•				•					•						
Grinders.....		•			•												
Painters, dippers, sprayers.....		•				•											
Moulders.....		•					•										
Welders.....		•											•				
Platers.....		•														•	
Vitreous enamel sprayers (fritmakers-brushers).....			•		•							•					
Firemen, furnace men.....				•													
Cabinet makers (assemblers).....					•												
Wood finishers.....					•												
Packers.....					•		•										
Impregnators.....								•	•								
Cleaners (washers).....									•			•					
Core makers.....										•				•			
Heat treaters.....													•				

TABLE 226—PERCENT OF WORKERS EXPOSED TO SPECIFIC MATERIALS HAVING INDICATED TYPE OF HAZARD CONTROL—ELECTRICAL MACHINERY INDUSTRY

[illegible]

TABLE 229—MAJOR EXPOSURES OF THE CHIEF OCCUPATIONS IN THE LAMP INDUSTRY

Number of Workers in Survey.....	2043
Number of Workers Exposed.....	959
Percent of Workers Exposed.....	47.0%
Number of Exposures per Person Exposed.....	2.1

Occupation	Dermatitis	Other metals	Organic dust	Lead	Non-siliceous dust	Alkalies	Acids, mineral	Alcohols, esters and ethers	Silica dust	Lacquer	Petroleum Silicate dust	Cyanide	Nitrogen oxides	
Number of workers exposed.....	259	221	199	146	138	136	132	117	91	87	78	69	66	39
Percent of workers exposed.....	12.7	10.8	9.8	7.2	6.8	6.7	6.5	5.7	4.5	4.3	3.8	3.4	3.2	1.9
Tool and die makers.....	•										•			
Screw machine operators.....	•										•			
Machinists.....	•	•									•			
Drill and punch press operators.....	•										•			
Buffers and polishers.....	•	•	•			•						•		
Packers.....	•		•			•			•					
Wood workers.....	•		•											
Solderers.....		•		•										
Assemblers.....		•		•										
Platers.....		•				•								
Painters, dippers, sprayers.....							•						•	•
Finishers.....								•		•				
Molders, core makers.....		•							•					

TABLE 230—PERCENT OF WORKERS EXPOSED TO SPECIFIC MATERIALS HAVING INDICATED TYPE OF HAZARD CONTROL—LAMP INDUSTRY

Materials	Number of exposures	Percent of exposed workers having specified control								
		Positive ventilation	Negative ventilation	Local exhaust	Isolation	Wet method	Gas masks	Respirators	Pressure helmets	Other
All specified materials.....	2,027	0.4	14.5	31.3	0.3	0.5		1.8		5.5
Dermatitis.....	259		11.9	0.4						3.9
Other metals.....	221	0.5	24.4	34.4	0.5	2.7		2.3		6.8
Organic dust.....	199	0.5	14.5	50.0				2.0		
Lead.....	146		6.2							6.2
Non-siliceous dust.....	138		0.7	58.0				2.9		
Alkalies.....	136		22.8	19.1						3.7
Acids, mineral.....	132		19.7	10.6						3.8
Alcohols, esters and ether.....	117		3.4	52.0				5.1		10.2
Silica dust.....	91		6.6	78.0	2.2			1.1		
Lacquer.....	87			73.5				11.5		12.6
Petroleum.....	78		2.6							
Silicate dust.....	69	4.3	4.3	26.1		5.8		1.5		
Cyanide.....	66		27.3	18.2						18.2
Infection.....	39		59.0	46.0						
Organic solvents.....	38			34.2				2.6		23.6
Other gases.....	35		45.7	31.4						
Carbon monoxide.....	26		38.4	38.4						
Chromium.....	24		35.7	95.7						50.0
Paint.....	24			20.8				12.5		
Cadmium.....	22			13.6						13.6
Sulphur.....	15	6.7	46.6	20.0						13.3
Oil.....	10		10.0	10.0	30.0					
Coal tar products.....	9			89.0				11.1		78.0
Dye.....	8	12.5	25.0	37.5						
Coal dust bituminous.....	7									
Hydrogen sulphide.....	7			100.0						
Hydrogenated hydrocarbons.....	6			33.3						
Accelerators.....	5			60.0						
Phosphorus.....	3									
Aldehydes.....	2			100.0						
Asbestos.....	2		100.0							
Ink.....	2									
Acids, organic.....	1		100.0							
Chemicals.....	1									
Arsenic.....	1									
Other salts.....	1		100.0							

TABLE 231—MAJOR EXPOSURES OF THE CHIEF OCCUPATIONS IN THE DRY CELL BATTERY INDUSTRY

Number of Workers in Survey.....	299
Number of Workers Exposed.....	200
Percent of Workers Exposed.....	67.0%
Number of Exposures per Person Exposed.....	2.0

Occupation	Lead	Organic dust	Other metals	Dermatitis	Coal tar products	Manganese	Chromium	Mercury
Number of workers exposed.....	82	67	39	39	29	26	23	23
Percent of workers exposed.....	27.4	22.4	13.0	13.0	9.7	8.7	7.7	7.7
Battery sealers.....	●●●	●			●			
Solderers.....	●●●							
Paste fillers.....	●●●		●●					
Experimenters.....	●●●		●●			●●	●●	●●
Core makers.....	●●●	●●	●●			●●		
Pitch machine operators.....		●●			●●			
Pourers.....	●	●●			●●			
Maintenance men.....				●●				
Punch press operators.....				●●				

TABLE 232—PERCENT OF WORKERS EXPOSED TO SPECIFIED MATERIALS HAVING INDICATED TYPE OF HAZARD CONTROL—DRY CELL BATTERY INDUSTRY

[illegible]

TABLE 233--MAJOR EXPOSURES OF THE CHIEF OCCUPATIONS IN THE RUBBER INDUSTRY

Number of Workers in Survey	3646
Number of Workers Exposed	2323
Percent of Workers Exposed	63.5%
Number of Exposures per Person Exposed	2.8

[illegible]

TABLE 234—PERCENT OF WORKERS EXPOSED TO SPECIFIED MATERIALS HAVING INDICATED TYPE OF HAZARD CONTROL—RUBBER INDUSTRY

[illegible]

TABLE 239—MAJOR EXPOSURES OF THE CHIEF OCCUPATIONS IN THE TOYS AND NOVELTIES MANUFACTURING INDUSTRY

Number of Workers in Survey.....	2626
Number of Workers Exposed.....	1300
Percent of Workers Exposed.....	49.4%
Number of Exposures per Person Exposed.....	1.9

Occupation	Organic dust	Alcohols, esters and ethers	Other organic solvents	Dermatitis producers	Other metals	Ink	Lead	Silica dust	Lacquer	Petroleum	Silicate dust
Number of workers exposed.....	380	244	222	189	149	131	130	119	112	110	106
Percent of workers exposed.....	14.9	9.3	8.5	7.2	5.7	5.0	5.0	4.5	4.3	4.2	4.0
Assemblers.....	•	•	•				•		•		
Packers.....	•										
Cutters, Trimmers.....	•										
Woodturners, carpenters.....	•										
Sanders.....	•										
Rubber workers.....	•	•									
Buffers and polishers.....	•										
Painters, sprayers, dippers.....	•	•	•	•	•				•		
Printers.....	•	•	•			•			•		
Punch press operators.....				•	•					•	
Tool and die makers, machinists, mechanics.....				•	•			•		•	•
Molders.....					•						
Die casters.....							•				
Shake-out men (foundry).....								•			

TABLE 240—PERCENT OF WORKERS EXPOSED TO SPECIFIED MATERIALS HAVING INDICATED TYPE OF HAZARD CONTROL—TOYS AND NOVELTIES INDUSTRY

[illegible]

TABLE 243—MAJOR EXPOSURES OF THE CHIEF OCCUPATIONS IN THE MIRROR MANUFACTURING INDUSTRY

Number of Workers in Survey.....	498
Number of Workers Exposed.....	299
Percent of Workers Exposed.....	60.7%
Number of Exposures per Person Exposed.....	2.0

Occupation	Silicate dust	Other metals	Non-siliceous dust	Lacquer	Alcohols, esters and ethers	Organic dust	Silica dust	Other gases	Other organic dust	Paint	Nitrogen oxides
Number of workers exposed.....	173	111	48	44	31	30	28	18	14	14	12
Percent of workers exposed.....	35.2	22.6	9.8	8.9	6.3	6.1	5.7	3.7	2.8	2.8	2.4
Grinders (bevelers) (engravers).....	●						●				
Cutters (edgers) (smoothers).....	●	●	●		●		●				
Polishers (cleaners).....			●			●	●	●			
Silverers.....				●			●				●
Lacquers, coaters.....				●	●				●		
Packers and shippers.....						●				●	

TABLE 244—PERCENT OF WORKERS EXPOSED TO SPECIFIED MATERIALS HAVING INDICATED TYPE OF HAZARD CONTROL—MIRROR INDUSTRY

[illegible]

TABLE 245—MAJOR EXPOSURES OF THE CHIEF OCCUPATIONS IN THE
SHOWER CURTAIN AND LAMP SHADE INDUSTRY

Number of Workers in Survey	350
Number of Workers Exposed	50
Percent of Workers Exposed	14.3%
Number of Exposures per Person Exposed	2.0

Occupation	Lacquer	Alcohols, esters and ethers	Other organic solvents	Organic dust	Other metals	Paint
Number of workers exposed.....	22	21	13	13	13	11
Percent of workers exposed.....	6.3	6.0	3.7	3.7	3.7	3.1
Painters, sprayers.....	●	●				●
Assemblers.....	●	●				
Finishers.....	●	●				
Printers.....			●		●	●
Cutters.....				●		

TABLE 246—PERCENT OF WORKERS EXPOSED TO SPECIFIED MATERIALS HAVING INDICATED TYPE OF HAZARD CONTROL—SHOWER CURTAIN AND LAMP SHADE INDUSTRY

[illegible]

TABLE 247—MAJOR EXPOSURES OF THE CHIEF OCCUPATIONS IN THE SCIENTIFIC INSTRUMENT MANUFACTURING INDUSTRY

Number of Workers in Survey.....1842
 Number of Workers Exposed.....968
 Percent of Workers Exposed.....52.4%
 Number of Exposures per Person Exposed.....1.7

Occupation	Dermatitis producers	Other metals	Lead	Organic dust	Petroleum	Silicate dust	Non-siliceous dust	Other organic solvents	Alcohols, esters and ethers	Lacquer	Alkalies
Number of workers exposed.....	298	145	133	124	118	110	90	79	70	69	45
Percent of workers exposed.....	16.2	7.9	7.2	6.7	6.4	6.0	4.9	4.3	3.8	3.7	2.4
Punch press operators, (machine hands).....	•••	•			••		•	•			
Tool and die makers.....	••	••			•						
Buffers and polishers.....	••	••		•		••	••				
Grinders (metal).....							••				
Platers.....		•••					••				
Painters, sprayers.....		••						•			
Welders.....		••			•				•	•	
Assemblers.....			••							•	
Solderers.....			••								
Sheet metal workers (tinsmiths).....			••								
Coil winders.....			••					•			
Shippers, packers.....				••					•		
Carpenters (cabinet makers) (pattern makers).....				••						•	
Sanders.....				••		•					•
Lens grinders.....											

TABLE 248—PERCENT OF WORKERS EXPOSED TO SPECIFIED MATERIALS HAVING INDICATED TYPE OF HAZARD CONTROL—SCIENTIFIC INSTRUMENT INDUSTRY

Materials	Number of ex- posures	Percent of exposed workers having specified control								
		Positive ven- tilation	Negative ven- tilation	Local exhaust	Isola- tion	Wet method	Gas masks	Respi- rators	Pressure helmets	Other
All specified materials...	1,604	4.2	5.8	26.4	0.2	11.1		5.7		3.4
Dermatitis	298	4.7	6.7							1.3
Other metals	145	2.1	6.2	36.6		30.4		5.5		4.2
Lead	133	2.3	7.5	18.8				0.8		1.5
Organic dust	124			51.6		2.4				4.0
Petroleum	118	11.8		6.8						12.7
Silicate dust	110	0.9		9.1	2.7	76.0				
Non-siliceous dust	90		7.8	49.0		41.0		8.9		
Organic solvents	79	10.1	8.9	36.7				17.7		1.3
Alcohols, esters and ether	70	7.2	5.7	61.5				30.0		
Lacquer	69	5.8	11.6	68.2				34.8		
Alkalies	45	2.2		6.7						8.9
Acids, mineral	43		21.0	23.2						21.0
Silica dust	34			70.5		29.4				
Other gases	32		12.5	12.5						
Mercury	26		23.0							
Halogenated hydro- carbons	18									
Oil	18		16.7	27.8						
Paint	18	5.6		22.2						
Coal tar products	17	17.6		17.6						
Cyanide	16			18.7						11.7
Fluorides	15		20.0	33.3						
Chemicals	14	7.1								
Carbon monoxide	14		7.1	21.4						
Dye	11			91.0				91.0		
Asbestos	9			100.0						
Chromium	9	11.1		77.7						33.3
Ink	9	44.4		55.5				55.5		
Nitrogen oxides	7		28.5	57.0						
Coal dust bituminous	6	16.7								
Cadmium	3			33.3						33.3
Aldehydes	2	100.0								100.0
Acids, organic	1									
Antimony	1	100.0								

TABLE 249—MAJOR EXPOSURES OF THE CHIEF OCCUPATIONS IN THE PLASTIC MOLDING AND FABRICATING INDUSTRY

Number of Workers in Survey.....	1229
Number of Workers Exposed.....	796
Percent of Workers Exposed.....	64.8%
Number of Exposures per Person Exposed.....	2.0

[illegible]

TABLE 250—PERCENT OF WORKERS EXPOSED TO SPECIFIED MATERIALS HAVING INDICATED TYPE OF HAZARD CONTROL—PLASTIC MOLDING AND FABRICATING INDUSTRY

[illegible]

TABLE 251—MAJOR EXPOSURES OF THE CHIEF OCCUPATIONS IN THE
IMPREGNATED PAPER MANUFACTURING INDUSTRY

Number of Workers in Survey	704
Number of Workers Exposed	518
Percent of Workers Exposed	73.6%
Number of Exposures per Person Exposed	1.6

Occupation	Lacquer	Alcohols, esters and ethers	Petroleum	Ink	Other organic solvents	Dermatitis producers
Number of workers exposed.....	261	233	194	64	37	12
Percent of workers exposed.....	37.0	33.0	27.6	9.1	5.3	1.7
Mounters.....	●	●				
Printers.....	●	●		●	●	
Coaters (coating machine operators).....	●	●	●			
Mixers.....	●	●				
Cleaners.....		●				
Machinists.....						●

TABLE 252.—PERCENT OF WORKERS EXPOSED TO SPECIFIED MATERIALS HAVING INDICATED TYPE OF HAZARD CONTROL—IMPREGNATED PAPER INDUSTRY

[illegible]

PERSONAL SERVICE INDUSTRIES

Personal Service Industries

The personal service industries were represented by 6901 workers in 124 plants. These workers were in the following classifications: laundries, dry cleaning and miscellaneous industries. The largest number of workers surveyed were in the laundry industry. Of the 6901 workers surveyed, 20.6 per cent were exposed, and each exposed worker averaged 2.1 exposures to specified materials. The major exposures were infections and alkalies. It was found that 33 of the 49 specified materials, used to record exposures, occurred in these industries. Table 255 reveals the number and per cent of workers exposed to specified materials. Table 256 reveals the number and percentage of total exposures to specified materials, or the distribution of each exposure. This table shows that the chief exposures to infections and alkalies were in the laundry industries. Table 257 reveals the extent to which control measures have been applied in these industries. Negative general ventilation was found to be the most prevalent type of control measure.

Laundry Industry: The laundry industry was represented by 5458 workers in 77 plants. Of these 5458 workers, 19.2 per cent were exposed, and each exposed worker averaged 2.1 exposures to specified materials. The major exposures were infections, alkalies and chlorine. It was found that 27 of the 49 specified materials, used to record exposures, occurred in this industry. Table 258 reveals the major exposures of the chief occupations in this industry. Table 259 reveals the extent to which control measures have been applied. It was found that negative general ventilation was the most prevalent type of control measure in this industry.

Dry Cleaning Industry: The dry cleaning industry was represented by 1417 workers in 42 plants. Of these 1417 workers, 25.6 per cent were exposed, and each exposed worker averaged 2.2 exposures to specified materials. The major exposures were organic solvents, infections, alcohols, esters and ethers, halogenated hydrocarbons, and organic acids. It was found that 26 of the 49 specified materials, used to record exposures, occurred in this industry. Table 260 reveals the major exposures of the chief occupations in this industry. Table 261 reveals the extent to which control measures have been applied. It was found that negative general and local exhaust ventilation were the most prevalent types of control measures in this industry.

TABLE 255—PERSONAL SERVICE INDUSTRIES—EXPOSURES TO SPECIFIED MATERIALS

Materials	All personal service industries in survey		Number and percent of workers exposed					
			Laundries		Dry cleaning		Other	
	No.	%	No.	%	No.	%	No.	%
Total number of workers.....	6,901		5,458		1,417		26	
Number of plants.....	124		77		42		5	
Acids, organic.....	148	2.1	61	1.1	84	5.9	3	11.5
Acids, mineral.....	17	*	15	*	1	*	1	3.9
Aldehydes.....	3	*	1	*	2	*		
Alkalies.....	413	6.0	341	6.3	64	4.5	8	30.8
Amines.....	3	*			3	*		
Coal tar products.....	7	*	3	*	1	*	3	11.5
Cyanides.....	1	*					1	3.9
Coal dust bituminous.....	93	1.4	77	1.4	16	1.1		
Silica dust.....	1	*			1	*		
Silicate dust.....	104	1.5	87	1.6	17	1.2		
Organic dust.....	144	2.1	121	2.2	22	1.6	1	3.9
Dye.....	74	1.1	48	0.9	26	1.8		
Dermatitis.....	18	*	16	*	2	*		
Fluorides.....	54	0.8	38	0.7	16	1.1		
Carbon monoxide.....	116	1.7	105	1.9	11	0.8		
Sulphur dioxide.....	9	*			2	*	7	26.9
Other gases.....	127	1.8	55	1.0	65	4.6	7	26.9
Chlorine.....	274	4.0	250	4.6	24	1.7		
Manganese.....	3	*	2	*	1	*		
Lead.....	16	*	9	*			7	26.9
Other metals.....	15	*	13	*			2	7.7
Nitrogen oxides.....	1	*					1	3.9
Infection.....	799	11.6	707	13.0	92	6.5		
Alcohols, esters and ethers.....	124	1.8	34	0.6	90	6.3		
Halogenated hydrocarbons.....	133	1.9	40	0.7	86	6.1	7	26.9
Ink.....	10	*	7	*	3	*		
Lacquer.....	5	*	4	*	1	*		
Oil.....	4	*					4	15.4
Organic solvents.....	225	3.3	57	1.0	157	11.1	11	42.3
Petroleum.....	66	1.0	54	1.0	12	0.9		
Paint.....	10	*	3	*			7	26.9
Other salts.....	15	*	11	*	4	*		
Sulphur.....	1	*	1	*				

* Denotes less than ½ of 1%.

TABLES 256—PERSONAL SERVICE INDUSTRIES—EXPOSURES TO SPECIFIED MATERIALS

Materials	All personal service industries in survey		Number and percentage of total exposures to the specified materials					
			Laundries		Dry cleaning		Other	
	No.	%	No.	%	No.	%	No.	%
Total number of workers.....	6,901		5,458		1,417		26	
Total number of exposures.....	3,033		2,160		803		70	
Acids, organic.....	148	61	41.2	84	56.8	3	2.0	
Acids, mineral.....	17	15	88.2	1	5.9	1	5.9	
Aldehydes.....	3	1	33.3	2	66.7			
Alkalies.....	413	341	82.6	64	15.5	8	1.9	
Amines.....	3			3	100.0			
Coal tar products.....	7	3	42.9	1	14.2	3	42.9	
Cyanides.....	1					1	100.0	
Coal dust bituminous.....	93	77	82.8	16	17.2			
Silica dust.....	1			1	100.0			
Silicate dust.....	104	87	83.6	17	16.4			
Organic dust.....	144	121	84.0	22	15.3	1	0.7	
Dye.....	74	48	64.9	26	35.1			
Dermatitis.....	18	16	88.9	2	11.1			
Fluorides.....	54	38	70.3	16	29.7			
Carbon monoxide.....	116	105	90.5	11	9.5			
Sulphur dioxide.....	9			2	22.2	7	77.8	
Other gases.....	127	55	43.3	65	51.2	7	5.5	
Chlorine.....	274	250	91.2	24	8.8			
Manganese.....	3	2	66.7	1	33.3			
Lead.....	16	9	56.3			7	43.7	
Other metals.....	15	13	86.6			2	13.4	
Nitrogen oxides.....	1					1	100.0	
Infection.....	799	707	88.7	92	11.3			
Alcohols, esters and ethers.....	124	34	27.4	90	72.6			
Halogenated hydrocarbons.....	133	40	30.1	86	64.6	7	5.3	
Ink.....	10	7	70.0	3	30.0			
Lacquer.....	5	4	80.0	1	20.0			
Oil.....	4					4	100.0	
Organic solvents.....	225	57	25.4	157	69.8	11	4.8	
Petroleum.....	66	54	81.8	12	18.2			
Paint.....	10	3	30.0			7	70.0	
Other salts.....	15	11	73.4	4	26.6			
Sulphur.....	1	1	100.0					

TABLE 257—PERCENT OF WORKERS EXPOSED TO SPECIFIED MATERIALS HAVING INDICATED TYPE OF HAZARD CONTROL—PERSONAL SERVICE INDUSTRIES

Materials	Number of exposures	Percent of exposed workers having specified control								
		Positive ventilation	Negative ventilation	Local exhaust	Isolation	Wet method	Gas masks	Respirators	Pressure helmets	Other
All specified materials	3,033	4.0	29.7	4.9	3.1	0.6		0.6		1.6
Infection	799	5.4	37.9		0.1					0.8
Alkalies	413	6.3	39.0	1.2	7.5			0.7		3.6
Chlorine	274	10.6	54.4	0.4	8.3			0.4		0.8
Organic solvents	225	0.9	20.0	21.4	4.4					0.9
Acids, organic	148		31.1	2.7	2.0					6.1
Organic dust	144	4.9	9.0	16.7	1.4	2.8		1.4		0.7
Haogenated hydrocarbons	133		20.3	6.1	3.0					
Other gases	127		22.8	11.8	2.4					0.8
Alcohols, esters and ether	124		24.2	7.3				2.4		
Carbon monoxide	116		8.6	9.5						
Silicate dust	104	5.8	6.7		0.9	8.7		0.9		
Coal dust bituminous	93	6.5	9.7			3.2		1.1		
Dye	74		40.5	4.1						8.2
Petroleum	66	3.0	9.1							
Fluorides	54		18.5	7.4	20.9					1.9
Dermatitis	18		44.5							
Acids, mineral	17		35.4	5.9						5.9
Lead	16									
Other metals	15									6.7
Other salts	15		46.6							13.3
Ink	10		80.0							
Paint	10			10.0						
Sulphur dioxide	9			75.0	11.1					
Coal tar products	7			42.8	14.3			42.8		
Lacquer	5			60.0				60.0		
Oil	4									
Manganese	3									
Amines	3				100.0					
Aldehydes	3		100.0							
Cyanide	1									
Silica dust	1					100.0				
Nitrogen oxides	1			100.0						
Sulphur	1		100.0							

APPENDIX-A

FIELD WORK TECHNIC

APPENDIX-A

Field Work Technic

The field work technic of the Illinois Industrial Hygiene Survey is fundamentally the same as that of the other states which have completed similar surveys. This technic is set forth in U. S. Public Health Service Bulletin 236. Therefore, only those salient points which reveal the effort taken to bring about a thorough and valued survey will be enumerated.

It was realized from the start that the value of a survey of this type rests chiefly with the number and quality of the individual plant surveys. This, in turn, depends wholly upon the ability, training, and efforts of the surveyor. With this in mind, it was evident that caution must be exercised in selecting the surveying staff. Consequently, it was decided to contact the American Chemical Society and the Western Society of Engineers, in order to obtain young graduate chemical and mechanical engineers who knew industry from experience and study. Fifteen engineers were chosen by interviews.

The surveyors so chosen were given a week of intensive training. This training consisted of three days of lectures by Sanitary Engineer J. J. Bloomfield, and Assistant Public Health Engineer Richard Page, of the U. S. Public Health Service, and the staff of the Division of Industrial Hygiene of the Illinois State Department of Public Health. The lecture periods were followed by three days of field work in which the surveyors were divided into three groups; each under the direction of an experienced industrial hygiene engineer. Having selected and trained the surveying staff, the survey was undertaken.

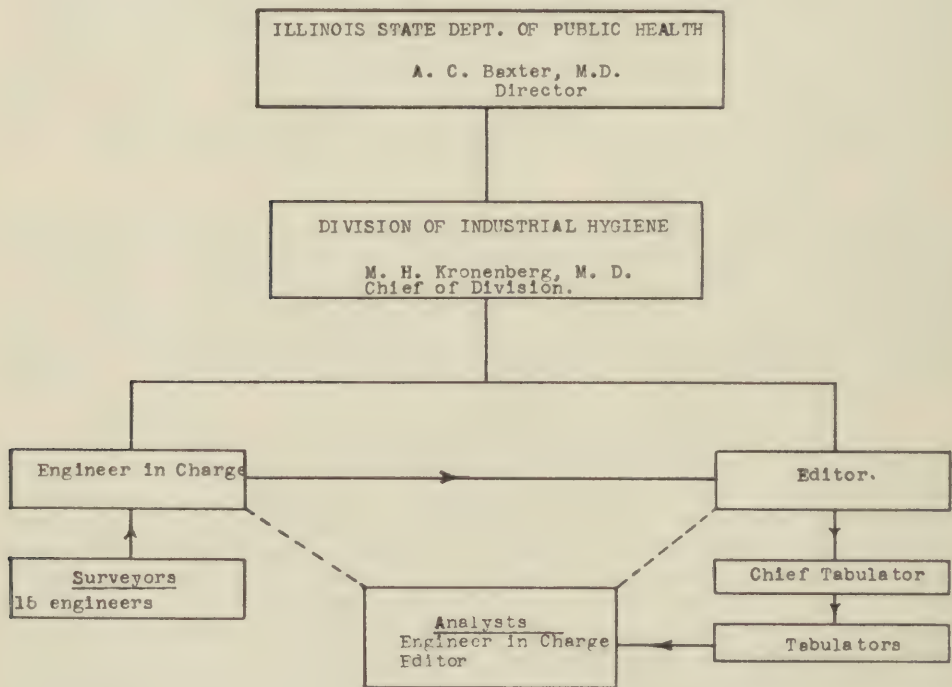
The organization of the survey is shown graphically in Figure 1. Previous to assigning each surveyor approximately 15 plants for his week's work, a letter similar to that shown in Form-1, was sent to each plant. This was done to acquaint the management with the purpose of the survey and thus facilitate the surveyor's entrance into the plant. Two types of survey forms were used by the surveyor in collecting the basic data. Forms 2 and 3 are examples of these forms. They were designed to yield the required information without depending too much upon the judgment of the surveyor. However, the surveyors were asked to sketch flow-sheets and room layouts of detailed processes and to make other general notes of the environmental conditions. They were instructed to do this on the reverse side of the forms. This additional data assisted the editor in his work.

Once a week the surveyors met with the engineer in charge and the chief of the division. In these sessions, the completed surveys were submitted to the engineer in charge and criticisms were made of the previously completed surveys, together with a general discussion for the purpose of clarifying certain points of the survey technic. Each completed survey was reviewed by the engineer in charge and coded. Those that were poor or that lacked some essential data were returned to the surveyors who made the corrections, which at times necessitated a return visit to the plant for additional data.

This is briefly the technic employed in conducting the field work. By this procedure, 57 of the 102 counties in Illinois were surveyed. Since Cook County is by far the largest industrial center of the state, approximately 53 per cent of the plants and 57 per cent of the workers surveyed were in this county. The survey distribution by county is shown in Figure 2.

ORGANIZATION OF THE ILLINOIS INDUSTRIAL HYGIENE SURVEY

Figure 1



FORM-1

STATE OF ILLINOIS
HENRY HORNER, GOVERNOR
DEPARTMENT OF PUBLIC HEALTH

A. C. BAXTER, M. D.
ACTING DIRECTOR

DIVISION OF INDUSTRIAL HYGIENE
1853 WEST POLK STREET
CHICAGO

M. H. KRONENBERG, M. D.
INDUSTRIAL MEDICAL SUPERVISOR
CHIEF OF DIVISION AND
PHONE MONROE 3900

Dear Sir:

The State Department of Health is conducting a survey of industries in Illinois. The purpose of the survey is to obtain general information concerning the conditions of environment associated with the various occupations which, potentially, may have an effect upon the health of employees. Such information is needed for the constructive development of a permanent industrial health service in Illinois. This survey will be extended to cover a representative sample of all industries in the State and the findings will be used to appraise the occupational disease problems. Such information will be used only for these purposes and will be treated in such a confidential manner that no portions of individual plant findings will be revealed.

We have selected a random sample of the various industries to be surveyed and your establishment was included. This selection is not to be interpreted as indicating that we anticipate finding conditions in your plant which are detrimental to health. On the contrary, we are just as interested in observing conditions which safeguard and promote improvement of the health of workers and, no doubt, you can demonstrate such facilities. Therefore, I can assure you that your establishment was selected without consideration of whether we might find the occupational environment poor, average or good.

A properly identified representative of this department will call on you within the next week or ten days for the purpose of making this survey. It will be very helpful if you could assign someone for the purpose of giving him the data needed and to accompany him throughout the plant.

Your kind cooperation will be greatly appreciated by this Department.

Very truly yours,

A. C. Baxter, M. D.
Director of Public Health
State of Illinois.

FORM 2

Form 3

INDUSTRIAL HYGIENE SURVEY

Industrial Health Services

Page _____ of _____
Surveyed by _____

Name of plant _____ Industry _____ Code _____ Date _____
 County _____ City _____ Location _____ M _____ P _____
 Plant owner _____ Address _____ No. of employees } F _____
 Plant official _____ Title _____ T _____

Safety provisions		Medical provisions			Benefits and records	
Safety director:	Full time _____ Part time _____ None _____	Hospital:	Company Contract _____ None _____	Physician:	Full time _____ Part time _____ On call _____ None _____	Sick benefit organization: Yes _____ No _____
Shop committee:	Yes _____ No _____	First aid room:	Yes _____ No _____	Nurse:	Full time _____ Part time _____ None _____	Sickness record: Yes _____ No _____
Insurance:	Yes _____ No _____	First aid kit:	Yes _____ No _____		P. H. _____ R. N. _____ Other _____	Accident record: Yes _____ No _____
Others:	Yes _____ No _____	Trained first aid worker:	Yes _____ No _____	Remarks:		O. D. coverage: Yes _____ No _____
Remarks:		General comments:				Remarks:

Work room data

Page of

Name of plant _____ Location _____ Industry code No. _____

Products manuf. or service.....Department.....Work room.....

Informants name..... Surveyed by..... Date.....

INDUSTRIAL HYGIENE SURVEY BY COUNTIES

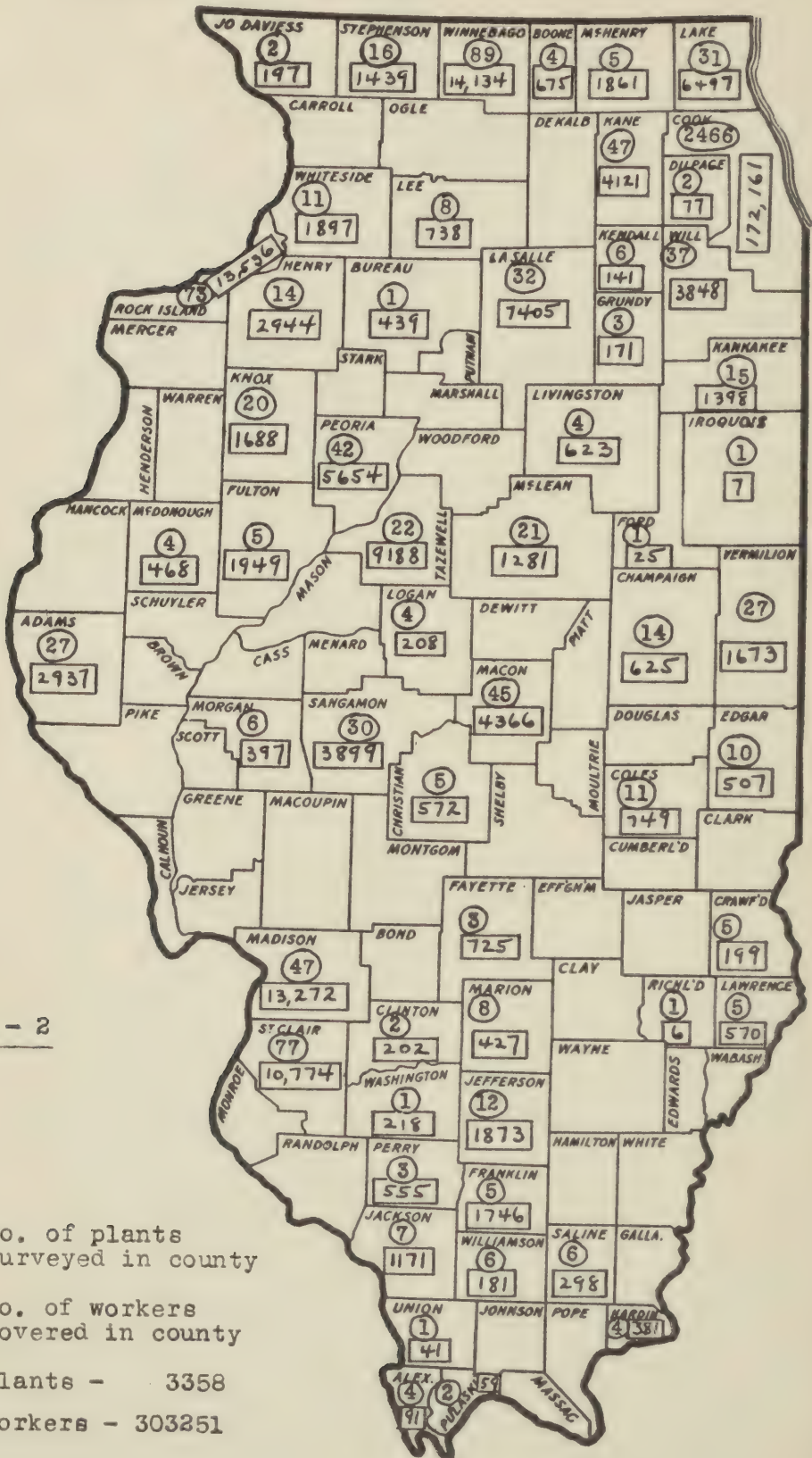


Figure - 2

Legend

- No. of plants
surveyed in county

- No. of workers
covered in county

Total plants - 3358

Total workers - 303251

APPENDIX-B

EDITING TECHNIC

APPENDIX-B

General Considerations

The fundamental technic of editing the Illinois Industrial Hygiene survey is substantially the same as set forth in U. S. Public Health Service Bulletin 236. However, as will be seen later, the technic allows a considerable latitude of interpretation and a brief review is, therefore, in order:

The investigator, when surveying a plant, records for each work room studied the occupation of each workman, the nature of his job, the raw material handled and eventual control measures present to mitigate already recognized hazards as dust, fumes and vapors, etc. These records are returned for editing and subsequent tabulation. As it would be virtually impossible to tabulate all of the raw materials and by-products as such, the materials have been classified in 49 major groups. Table 1 gives the major material classification and Table 2 gives examples of products included under each major group.

The qualifications and duties of the editor are manifold. First, of course, he should have a sufficient knowledge of chemistry to be able to classify material appearing on the survey sheet; second, he should have sufficient knowledge of the reactions involved in chemical processes throughout the industry to recognize if and what kind of by-products are produced; and, third, be familiar enough with all industrial processes to find and suspect omissions or misinformation appearing on the survey forms so that they can be returned to the surveyor for check-ups and corrections. It is this ability which enables the editor to correctly apply the exposures present to an occupation resulting later in a maximum degree of accuracy in the quantification of the exposures.

Realizing that, if a comparison is made between the Illinois survey and surveys made by other States in the matter of occupational exposures, somewhat different pictures may be obtained from the occupational analysis even in the same industrial group, it is pertinent to point out that these differences can partly be explained as reflecting the individual technic of the editor in giving or omitting exposures as stated by surveyor on the survey sheet. Theoretically, there are two courses to follow in editing. The first one is fairly simple. After the survey report has been checked with reference to accuracy of information, the editor may give the occupation an exposure to all the materials present, as listed by the surveyor, which falls in any of the 49 major classifications.

However, it soon became apparent to the editor of this survey that some potential exposures are more remote than others, and if a distinction could be made by omitting the most remote potentialities, the resultant picture would come closer to the actuality and give more clear-cut differences between the various industrial groups as well as the various occupations in each group. This is the alternate method of the first one mentioned above and requires thorough knowledge of industrial occupations as well as mature judgment of the editor in determining borderline cases of exposures, in other words, to determine when does an exposure become an industrial exposure. As there can be no set standards to follow, the procedure being one involving personal opinions and considerations, backed by technical knowledge of the editor, there is no other way of further illuminating this procedure than by discussing some principles used in allocating the various exposures.

Take as an example, the potential exposure to carbon monoxide, a gas usually produced by incomplete combustion. Potentially, this gas may be produced in industry wherever combustion takes place, at furnaces, boiler plants, appliances heated by gas and oil, internal combustion engines, etc. Some of these combustion processes are provided with exhaust to the open air; some have no exhaust but exude the combustion gases directly into the work room air.

Unless one exercises some discrimination in allocating carbon monoxide exposures, one would have to give all the workers in such a work room this exposure inasmuch as the possibility of carbon monoxide occurring at one time or another is always present. Due to the almost universal use of the combustion process in one form or another in practically all industries for various heating purposes, the result of the tabulation would show a tremendous potential carbon monoxide exposure in all industries and it would be virtually impossible to deduce from the exposure figures in which industry or occupation an actual exposure to carbon monoxide would be probable. In the present survey, therefore, the editor has tried to give some consideration to both the probability and the intensity of the exposure. He has taken the attitude that in order to merit an exposure, the occupation should be of a strictly industrial nature and occur with enough of a frequency and duration to consider the potential exposure to have a fair probability of becoming an actual hazard under some plausible condition. Consider, for instance a workman in a small plant who, among other duties, has assigned to him the care of a small heating plant located in the basement, and used for keeping the plant heated. The furnace may have automatic feed, be thermostatically controlled and need the minimum amount of attention. It is true that for short periods this workman may be potentially exposed to combustion gases from leaky flues, etc. and from silicates and alkalies present in the process of ash removal, but the editor felt that when compared to the similar exposure the workman may have in tending the furnace in his own home, one could hardly call this exposure an industrial exposure. Furthermore, considering the frequency and duration of the potential exposure, the probability of an actual occurrence becoming a serious problem is so remote that it should justly be neglected.

Even in cases where the potential exposure of this kind would come under the classification of strictly industrial as in the case of firemen and engineers in boiler rooms, considerations have been given to the probabilities of exposures when using different types of heating equipment. For instance, in the case where natural draft is used in an efficient steam generating plant, there is hardly any possibility of carbon monoxide exposure compared to the possibility of carbon monoxide exposure from a leaky flue when using forced air in connection with powdered coal and oil.

To illuminate the question of carbon monoxide exposure further, as well as the exposure to the other combustion products which comes under the classification of "gas", there is quite a distinction between the potentiality of an exposure ever becoming actual and serious in a large work room where a few Bunsen burners or small gas furnaces are located compared to that of a relatively small work room where large gas-fired annealing furnaces are located, and from which the combustion gases are allowed to escape directly into the room air. In the former case if, in the judgment of the editor, the number of burners and heating appliances used, their accessibility of inspection and the size of the work room warrants it, the workers are given an exposure to "gas" but not to carbon monoxide as in this type of burners the chances of incomplete combustion or even accidental extinction of the flame, is rather remote when the flames are constantly watched and if anything happens to the flame it would be immediately readjusted.

In the case of large annealing furnaces, under the conditions described, the workmen are, of course, given "gas" exposure and also carbon monoxide exposure. Although it may be argued that in these furnaces the combustion is also in general complete, several instances of carbon monoxide intoxication and deaths have occurred when starting up cold furnaces after a prolonged shut down.

Following the same line of thinking, a sander of soft material as wood or plastics, is not given any mineral dust exposure from the disintegration of the abrasive used as this is considered negligible, nor are welders using electric spot-welding machines given any metal oxide exposures for the same reasons.

Numerous similar situations could be cited but the above may be sufficient to illustrate the conservatism used in the allocation of exposures to different occupations. It is believed that by so doing a more clear-cut and comprehensive picture is obtained from the resultant tabulation of material exposures than if no discriminations of the above nature had been made.

For the benefit of those persons particularly interested in this phase of the survey, the major classification groups of material, with their corresponding code designation, are given in table 1 as well as the most common materials encountered in the industry with the corresponding exposure allocation in table 2. In addition, an actual example is given of a survey form filled in by the field engineer and coded for tabulation by the editor.

Major Material Classification

In the list following, it will be noticed that some of the classifications are of more general nature than others, as for instance, Chemicals, Inks, Paints, Accelerators, etc. These have been used as sparingly as have been possible and only when definite information in regard to the composition of the material has been lacking, or, as in the case of many processes and occupations, so many and different materials were being used that no preponderant specific exposure could be given.

TABLE NO. 1.

Material	Code Symbol	Material	Code Symbol
Acids, organic.....	AcO	Chlorine.....	Cl
Acids, mineral.....	AcM	Arsenic and its compounds.....	As
Accelerators.....	Acc.	Chromium and its compounds.....	Cr
Aldehydes.....	Ald.	Cadmium and its compounds.....	Cd
Alkaline compounds.....	Alk.	Mercury and its compounds.....	Hg
Aniline and its compounds.....	Ani	Manganese and its compounds.....	Mn
Amines.....	Ams	Lead and its compounds.....	Pb
Chemicals (organic and inorganic).....	Chm	Radioactive materials.....	Ra
Coal tar products.....	C.T.P.	Antimony and its compounds.....	Sb
Cyanides.....	CN	Selenium and its compounds.....	Se
Dust, asbestos.....	Asb	Other metals and their compounds.....	O.M.
Dust, coal (bituminous).....	Cdb	Nitrogen oxides.....	Nox
Dust, coal (anthracite).....	Cda	Infectious material.....	Inf
Dust, silica.....	Sil	Alcohols, ethers and esters.....	A.E.E.
Dust, silicate and carborundum.....	ate	Halogenated hydrocarbons.....	HH
Dust, non-siliceous.....	NoS	Inks.....	Ink
(mineral dust other than those falling under special classifications)		Lacquers and varnishes.....	Lac
Dust, organic.....	Org	Medicinals.....	Med
Dyes.....	Dye	Oils, fats and waxes.....	Oil
Dermatitis producers.....	Der	Organic solvents (other than specified).....	O.S.
Fluorides.....	Fl	Petroleum products (except solvents).....	Pet
Carbon monoxide.....	CO	Paints.....	Pnt
Hydrogen sulphide.....	H ₂ S	Phosphorus.....	P
Sulphur dioxide.....	SO ₂	Salts, inorganic technical and analytical.....	S'lt
Other gases.....	Gas	Sulphur and alkaline sulphides.....	S

Examples of Products Included under Major Material Classifications

In the following table are listed some common materials encountered in industry, with their corresponding code symbol denoting under which of the 49 major material groups they appear in the survey.

It will be noticed that some materials have been given more than one classification. In the process of editing, however, it does not necessarily mean that a workman handling those materials have been given all the designated exposures. He may have been given one or the other, none or all, depending upon the state and nature of the material and the method in which it was handled.

TABLE NO. 2.

Material	Code Symbol	Material	Code Symbol
Accelerators.....	Acc	Cobalt and its compounds.....	O. M.
Acetanilide.....	Ani	Cocain.....	Der
Acetic acid.....	AcO	Codeine.....	Der
Acetone.....	AEE	Coke.....	Org
Acetylene.....	Gas	Copper and its compounds.....	O. M.
Acrolein.....	Ald	Corundum.....	NoS
Alcohols.....	AEE	Cotton.....	Org
Alkaloids.....	Der	Creosote.....	C. T. P.
Alundum.....	NoS	Cumar resins.....	C. T. P.
Alum.....	S't	Cutting compounds.....	Der
Aluminum oxide.....	O. M.	Cyanides.....	CN
Ammonia.....	Gas	Cyanogen.....	CN
Ammonium chloride.....	S't	Dough.....	Org, Der
Ammonium hydroxide.....	Alk, Gas	Dextrine.....	Org
Amyl acetate.....	AEE	Diatomite.....	Sil
Aniline.....	Ani	Diphenyl guanidine.....	Ams
Aniline dyes.....	Ani	Dyes, other than aniline dyes.....	Dye
Antimony.....	Sb	Emery dust.....	NoS
Antimony sulphide.....	Sb	Ethyl acetate.....	AEE
Arsenic.....	As	Ethyl alcohol.....	AEE
Arsine.....	As	Ethyl chloride.....	HIH
Ashes.....	'ate	Ethyl bromide.....	HIH
Asbestos.....	Asb	Enamel (when ingredients not specified).....	P'nt
Asphalt.....	Pet	Esters.....	AEE
Bakelite.....	C. T. P.	Ethers.....	AEE
	Ald.	Ethanol amines (mono-, di and tri-).....	Ams
Barium sulphide.....	S	Ethylene diamine.....	Ams
Barium sulphate.....	NoS	Ethylene dichloride.....	HIH
Bentonite.....	'ate	Feathers.....	Org, Inf
Benzene (Benzol).....	O. S.	Felt dust.....	Org
Benzine.....	O. S.	Ferrosilicon.....	'ate
Bonemeal.....	NoS	Fibre.....	Org
Brass.....	O. M.	Fibreboards.....	Org
Brine.....	S't	Fire clay.....	'ate
Bronzing powder.....	O. M.	Flint.....	Sil
Butyl acetate.....	AEE	Feldspar.....	'ate
Butyl aldehyde.....	Ald	Flour.....	Org
Cadmium.....	Cd	Formaldehyde.....	Ald
Calcium carbonate.....	NoS	Formic acid.....	AcO
Calcium chloride.....	S't	Fullers earth.....	'ate
Calcium cyanamid.....	Ams	Furs.....	Org, Inf
Calcium hydroxide.....	Alk	Gasoline.....	O. S.
Calcium phosphate (Tri-).....	NoS	Gannister.....	Sil
Carbon black.....	Org	Garnet.....	'ate
Carbon dioxide.....	Gas	Glass.....	'ate
Carbon disulphide.....	O. S.	Graphite.....	Org
Carbon monoxide.....	CO	Grease (lubricating).....	Pet
Carbon tetrachloride.....	HIH	Gums.....	Org
Carborundum.....	'ate	Gypsum.....	NoS
Caustic soda.....	Alk	Granite.....	'ate, Sil
Celluloid.....	Org	Hair.....	Org, Inf.
Cement, buildings.....	'ate, Alk	Hexamethylene-tetramine.....	Ams
Chemicals, organic and inorganic not other- wise specified.....	Chm	Hexine.....	C. T. P.
Chlorine.....	Cl	Hides (raw).....	Inf
Chloroform.....	HIH	Hydrochloric acid.....	AcM
Chlorinated naphthalene.....	HIH	Hydrocyanic acid.....	CN
Chocolate.....	Der	Hydrofluoric acid.....	Fl
Chromates.....	Cr	Hydrogen sulphide.....	H'S
Chromic acid.....	Cr	Hydroquinone.....	C. T. P.
Chrome alum.....	Cr	Inks.....	Ink
Chrome ore.....	Cr	Iodine.....	Med
Clay.....	'ate	Infusorial earth.....	Sil
Coal dust, anthracite.....	C Da	Iron dust.....	O. M.
Coal dust, bituminous.....	C Db	Iron oxide.....	O. M.
		Iron pyrites.....	O. M.

TABLE 2—Concluded

Material	Code Symbol	Material	Code Symbol
Japan compounds.....	P'nt	Radium.....	Ra
Kaolin.....	'ate	Raus.....	Org, Inf
Kapok.....	Org	Resins.....	Org
Kerosene.....	O. S.	Resin.....	Org
Kieselguhr.....	Si	Rouge.....	O. M.
Lacquer.....	Lac	Rubber.....	Org
Lamp black.....	Org	Rubber cement.....	O. S.
Lard.....	Oil	Sal soda.....	Alk
Lead.....	Pb	Sand.....	'ate, Sil
Lead chromate.....	Pb, Cr	Saw dust.....	Org
Lead salts.....	Pb	Shellac.....	Lac
Litharge.....	Pb	Sisal (hemp).....	Org
Lithopone.....	NoS	Slate.....	'ate
	O. M., S	Soda ash.....	Alk
Leather cement.....	O. S.	Soapstone.....	'ate
Leather.....	Org, Inf	Sodium borate.....	'ate
Lime, quick or slaked.....	Alk	Sodium bisulphite.....	S'il
Lime stone.....	NoS	Sodium carbonate.....	Alk
"Liquid Sulphur" (sulphur in carbon disulphide).....	O. S., S	Sodium chloride.....	S'il
Lubricants.....	Pet	Sodium cyanide.....	CN
Magnesium oxide.....	Alk	Sodium hydroxide.....	Alk
Magnetite.....	NoS	Sodium hypochlorite.....	Alk, Cl
Manganese and its compounds.....	Mn	Sodium metaphosphate.....	Alk
Marble.....	NoS	Sodium nitrate.....	S'il
Meats.....	Der, Inf	Sodium silicate.....	Alk
Mercury and its compounds.....	Hg	Sodium sulphide.....	S
Mesothorium.....	Ra	Sodium sulphite.....	S'il
Methanol.....	AEE	Sodium thiosulphate.....	S'il
Methyl acetone.....	AEE	Spices.....	Org
Methyl chloride.....	H1H	Stains.....	Dye
Metal fumes (other than specified).....	O. M.	Starch.....	Org
Mica.....	'ate	Stearic acid.....	AcO
Mineral oils.....	Pet	Steel.....	O. M.
Montanine.....	Fl	Straw.....	Org
Morphine.....	Der	Sugar.....	Der, Org
Muriatic acid.....	AcM	Sulphur.....	S
Mustard.....	Org	Sulphur monochloride.....	S'il
Naphthol.....	O. S.	Sulphuric acid.....	AcM
Naphthalene.....	C. T. P.	Sulphur dioxide.....	SO ₂
Nitre cake.....	S'il	Sulphuretted hydrogen.....	H ₂ S
Nitrogen oxides.....	Nox	Talc.....	'ate
Nitro benzol.....	C. T. P.	Tallow.....	Oil
Novaculite.....	Sil	Tannic acid.....	AcO
Nickel and its compounds.....	O. M.	Tar.....	C. T. P.
Oils, vegetable and animal.....	Oil	Tetrachlorethane.....	H1H
Oils, mineral.....	Pet	Titanium oxide.....	O. M.
Oxalic acid.....	AcO	Toluol.....	O. S.
Ozone.....	Gas	Toluidine.....	Ani
Paint, lead.....	P'nt, Pb	Tobacco.....	Org, Der
Paint, non-lead.....	P'nt	Trichlorethylene.....	H1H
Paper.....	Org	Tridymite.....	Sil
Paraphenyldiamine.....	C. T. P.	Tripolite (tripoli).....	Sil
Paraffin.....	Pet	Trisodium phosphate.....	Alk
Pharmaceuticals.....	Med	Type metal.....	Pb, Sb
Phenolic resins.....	C. T. P., Ald	Turpentine.....	O. S.
		Tuads.....	C. T. P.
Phosgene.....	Gas	Vanilla bean.....	Der
Phosphine.....	P	Varnish.....	Lac
Phosphoric acid.....	AcM	Vegetable products.....	Der
Picric acid.....	C. T. P.	Vegetable oils.....	Oil
Pipridine.....	AmS	Vinegar.....	AcO
Pitch.....	C. T. P. or Pet	Washing powder.....	Alk
		Waxes.....	Oil
Phenol.....	C. T. P.	White lead.....	Pb
Portland cement.....	'ate, Alk	Wood alcohol.....	AEE
Potash.....	Alk	Xylol.....	O. S.
Potassium cyanide.....	CN	Zinc.....	O. M.
Potassium dichromate.....	Cr	Zinc cyanide.....	CN
Potassium hydroxide.....	Alk	Zinc hydrosulphite.....	S'il
Potassium sulphide.....	S	Zinc nitrate.....	S'il
Prussic acid.....	CN	Zinc oxide.....	O. M.
Pumice.....	'ate	Zinc stearate.....	O. M.
Pyrophyllite.....	'ate	Zinc paint.....	P'nt
Quartz.....	Sil	Zinc sulphide.....	O. M., S

INDUSTRIAL HYGIENE SURVEY

Work room data (continued)

Page 12 of 24

Name of plant.....Location.....Industry code and No. 2VB
 Products manuf. or service: Asbestos products.....Department.....Work room 10
 Informants name.....Surveyed by.....Date 1-6-38

Occupation	Number of persons			Nature of job	Raw materials and by products	Control measures							Editor's Remarks
	M	F	T			Local exh	Isolation	Wet method	Gas mask	Respirator	Press hel.	Other	
Grinder.....	1		1	Breaks up imperfect pipe covering and sheet insulation in a disintegrator.	Asbestos pipe and insulation. Asbestos dust Silicate of soda dust	+	-	-	-	+	-	-	Asb-L-R
						Approved for dust							
Sheet insula- makers.....	3		3	Spread asbestos on tray, saturate with silicate of soda, press between plates in hydraulic press. Load dryer.	Asbestos Asbestos dust Silicate of soda	+	-	-	-	+	-	-	Alk Asb-L-R
						Approved for dust							
Pipe cover- ing makers	4		4	Build asbestos pipe covering upon circular mandrels. Use circular saws to cut off ends. When formed, place in steam drier to dry.	Asbestos, silicate of soda, asbestos dust	+	-	+	-	+	-	-	Asb-L-W-R Alk
						(1) on oven						↑ approved	
Total.....													

(1) Asbestos is wet with sodium silicate.

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